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Are Engineers Good Managers?

OF course they are!—in some cases. Everybody could name a score of excellent managers in some branch or other of the electrical industry who were trained as engineers and held technical appointments before any thought of management entered their heads. On the other hand, for every one of these successes there could also be named another, whose technical attainments have been very slight, yet to whom has fallen the control and enterprising development of electrical business.

With these facts in mind we are always inclined to regard disapprovingly the generalisations with which some men of one class exaggerate the de-merits of those of the other. In our ever-expanding and continually changing industry both have proved to be necessary, and only the super-confident would presume to judge which had contributed the greater measure to its success.

We are aware that we are touching what has long been a very controversial subject. If we refuse to be led into the tortuous tangle of arguments and prejudices at this moment it is not because we wish to burke discussion of the main question, but because we want to speak plainly upon one aspect in particular without any confusing clouds.

We have reached a stage in the reorganisation of Britain's electricity supply when it will be wise for engineers who are responsible for a large number of undertakings to put on their thinking caps. In the now quite natural order of things the question must arise whether they are qualified to drop a good deal of their engineering interest and become live managers developing the *sale* of electricity for all they are worth.

Concentration upon distribution will for them become nine-tenths a commercial matter. Are they cut out for it? If they have the aptitude or capacity for it are they willing? If after having put this problem into their pipes and smoked it, they find themselves too grooved to qualify, too old to change, or too interested in technics to engage in business development, they should resign themselves to inevitable supersession sooner or later.

It seems unlikely that they will be able to maintain original status as engineers in existing positions when nearly everything else is changing. Compensation there may be under certain circumstances and conditions. But however all these things may be, one thing will be more definite than any other soon, namely, that obstructions or handicaps, whether material or personal, to a truly progressive electrical distribution policy will have to remove themselves or be removed.

Though the business of electricity supply is undergoing change there will, of course, be the work of a distribution engineer to be done, but in every area electricity supply must be developed along business lines—custom must not be *allowed* to come in of its own accord; it must be progressively catered for and *sought*. Only in this way will Britain reap from end to end the benefits of the ampler provision and the better organisation for which we have worked since under national orders the Commissioners and the Board began their task.

The needs of industry, the betterment of domestic life, and the promotion of huge sales of electrical products—none of these should be sacrificed through the unwillingness of an engineer to delegate management authority to the commercially competent or through the local conceptions of municipal councillors, or the short-sighted self-interest of directors of companies.

Cooker Facts and Fancies

THE lighter touch of the crayon and the inspiration of imagination have been brought to bear upon electric cooking this week. The discussion at last week's E.D.A. conference, at which two anonymous papers made a dual plea for cooker standardisation, showed clearly that the most urgent need is co-operation. One speaker made it clear that both manufacturers and supply engineers desired to co-operate because they agreed that the pre-

sent design of cooker was not all that it might be, and both parties eagerly wanted a bigger output. But we came away with the impression that cohesion between the supply engineers themselves and the manufacturers themselves was sadly lacking. This was reflected in the failure of the British standard cooker. Each side must be certain of what it wants before there can be any measure of standardisation. On the other hand, mass production was almost unanimously condemned. Are those who condemned it not being too technical in their interpretation of the term? Whether we want mass production in its broadest or American sense or not, the fact remains that this is the only means of lowering the cost of cookers. Again, the more cooking consumers there are connected the lower will be the supply tariffs. Let us get rid of mere personal prejudices and thus dispel the false impression that the merits of electric cooking remain unproved, for nothing is so directly contrary to the truth.

William Henry Patchell

CONSULTING engineering as well as electricity supply has lost one of its outstanding figures by the death of Mr. W. H. Patchell. For more than fifty years he had been connected with the technical side of the industry, for he was numbered among the engineers who went to represent British manufacturing interests at the Paris Electrical Exhibition of 1881. To members of the Institutions of Electrical and Mechanical Engineers he was well known. His interests ranged from accumulator manufacture to the steam and electrical equipments for metropolitan electricity supply, and also to industrial and mining installations. He had long made a special study in Europe and America of prime-mover tendencies and developments, and in recent years his name had been especially associated with large modern boiler practice.

The Availability of Supply

WE were glad to hear Professor Marchant, at the South Midland dinner of the I.E.E., emphasise greater availability of supply as an outstanding benefit of the grid. While fully agreeing with Sir Hugo Hirst's dictum that the cheap unit is the finest raw material this country can produce, we have consistently maintained that an immediate cheapening of electricity to the retail consumer, generally, cannot be reasonably expected as a result of the Central Board's operations. The I.E.E. President referred to the national scheme as the beginning of electrification in Great Britain, and submitted that there was no other plan by which electricity could be supplied to a whole countryside at a reasonable cost. The monetary value of availability cannot be assessed so readily as that of reductions in production costs, but its indirect advantages will be another of those imponderables which, after an electrical scheme has been accepted upon its direct economic merits, so often prove to be of greater importance than those factors which make the more immediate appeal.

"Efficiency" and Effectiveness

THERE is probably no greater field for the development of electricity supply than building heating, and there are few fields to which the electrical engineer has given less attention. What little has been done in the right way has proved the case for the electrical method. These are merely reiterations, but they are justified, particularly at the present moment, because of the presentation of Mr. A. H. Barker's paper at the Institution of Electrical Engineers last evening. All interested in electrical development should study the paper closely. In breaking away from thermal efficiency arguments, which have retarded progress for many years, Mr. Barker, who is primarily a heating rather than an electrical engineer, has shown us the open road. From the electricity supply engineer's point of view, perhaps the most interesting feature of the paper is the favourable case made out for local electrical heating at 0.5d. per kWh as against thermal storage heating with electricity at 0.3d. per kWh. The paper represents no new development, but its vital importance rests on the fact that it is a definite expression of what has been tacitly accepted by electrical engineers for a long time.

An "All-In" Scheme

WE think that the scheme recently adopted by the Formby (Lancs) Council is one that could be more widely applied with considerable advantage. For a moderate all-in quarterly charge the Council is providing the wiring and lighting, a cooker, a washboiler, four fires, an iron and a kettle, and the charge covers the first 240 kWh consumed. From the consumers' point of view this has much to recommend it, and is certainly an encouragement to go "all-electric." We presume that the Council has fixed the charge with due regard to all the factors involved, and expects to make a profit, and we shall be interested to learn the results. In the meantime, we recommend the idea to other supply authorities.

"A Little Learning"

A GOOD example of the truth of Pope's line that "a little learning is a dangerous thing" is to be found in a popular magazine, which gives prizes for useful hints sent in by its readers. Five shillings was awarded for the description of a simple and inexpensive method of providing a dimmer for electric lamps. It consists in connecting the live terminal of the single-pole circuit switch to another switch, the second terminal of which is earthed. The writer advises that the two switches should not be "on" at the same time. The efficiency of this proposal depends upon three conditions that are not permissible: (a) the fixing of the single-pole switch in the neutral wire; (b) the existence of a leak on the neutral side of the lamps; and (c) the earthing of the neutral on the consumer's premises, which is contrary to the official regulations. Moreover, the lamps would be dimmed only if the gas pipe (or other handy earthing medium selected) or the installation fault presented a fairly high resistance path to earth. This might be regarded merely as an amusing instance of misplaced ingenuity unjustly rewarded if it were not for the public encouragement given to amateur wiremen to introduce dangers in normally safe installations.

Not News

SOME of our lay contemporaries have been letting themselves go during the past few days on what they evidently regard as new electrical inventions. There is probably no harm in bringing home to the man in the street the great potentialities of photo-electric devices or the merits of wireless tuning coils that give high selectivity. Our objection is to the implication that our manufacturers are very much behind those of America in the applications of photo-electric control (several articles published by us show the real position), and that they cannot produce sets of the highest selectivity unless they use the German "Ferrocast" coil. We are no friends to the idea that we have nothing to learn from the foreigners, but we see no merit in giving them unearned credit of this kind.

Shapen in Iniquity

IN this issue we publish a letter from a hotel proprietor in which E.D.A. and ourselves are severely chided for what they and we have said about British hotels. Our correspondent is evidently enlightened himself (he reads the ELECTRICAL REVIEW), but we cannot in the face of experience agree that hotels generally do not require enlightenment. We are sure that E.D.A. will not profess altruism in this matter—rather is it a case of enlightened self-interest. He says that the Hotel Lighting Campaign was "conceived in greed, born of ignorance, reared on misstatements." For this gynaecological insult the appropriate punishment is to condemn him to sojourn for a period of years in some of the hotels at which we have stayed.

Impressions of some of the Participants in last Friday's E.D.A. Conference on Cookers (*see page* 811)

Rural Electrification. By F. Gurney, A.M.I.E.E.

Planning a 33-kV scheme

THE problems peculiar to rural electrification are merely those dictated by the absolute necessity for low capital outlay. They can be divided into those relating to (1) feeders for transmission and distribution, and (2) switchgear and transformers. Feeder equipment is the heavy item in the capital account, and rural electrification has become possible by the general adoption of overhead lines. There exist very stable ideas with regard to the design and erection of overhead transmission and distribution equipments, but much less attention has been directed to the equally important subject of switchgear and transformer equipment, excepting to employ as little as possible at as low a cost as possible.

Although the cost of switchgear and transformers is low compared with the cost of overhead lines, it is false economy to omit those details which will subsequently make a scheme workable. Operation follows on the heels of erection and the practicability or otherwise of operating a system depends on the design or absence of design in the original planning, especially with regard to switching and transforming arrangements. Excepting in one or two "model areas" most schemes grow gradually by adding a bit here and a bit there; without an original plan they suffer from the danger of becoming inflexible, and small troubles will affect large areas.

It would probably be difficult to discover an area which could be described as rural in the strict sense of the term, and most areas will contain potential consumers requiring differing values in service. In planning a scheme for a complete area an assessment of these values will be needed, so that suitable provision can be made to give the desired service.

[*Guttenberg, Ltd., Manchester*

Mr. F. Gurney has had much experience in generation and distribution work and has been associated with many important industrial electrification schemes carried out by the Metropolitan-Vickers Co.

Relative Importance of Continuity

A division of consumers into three classes will serve to indicate a method of discriminating between them :—

Class "A" consumers :—(1) Bulk supplies to small towns, where there may be industrial load, and where gas may be available as a competitor; (2) such incidental consumers as pumping stations and sewage disposal works; (3) occasional factories carrying on a local industry, such as a dairy produce factory, a quarry, a timber yard, a tannery, or a textile mill.

Class "B" consumers: (1) Large country houses, where substantial revenue guarantees are obtainable; (2) large farms with a motor load; (3) the larger villages.

Class "C" consumers: (1) Small villages, where the prospects justify a minimum of equipment; (2) small farms where a supply is often given to propitiate a farmer over whose fields lines have been erected.

Overhead lines cannot be designed to withstand permanently the various external influences which cause interruptions of supply. Storms account for most of them; electrical storms may damage switchgear and transformers. Fortunately the majority of interruptions are due to causes which do not put a line permanently out of commission.

Common experience will probably confirm that from 90 to 95 per cent. of interruptions of supply on overhead transmission lines at voltages 33 kV to 11 kV are caused by transient troubles, which leave the line ready for immediate service again. For those cases where a line may be disabled until a fault can be located and repaired, the different types of consumers require different treatment in the provisions made for alternative means of supply.

Duplicate Supplies

The common ways of giving an alternative supply are by installing either duplicate feeders or a ring main. The duplicate feeder is desirable for class "A" consumers, as it becomes possible for the supply authority to adopt the sensible scheme of allowing the consumer himself to change over immediately to the alternative supply without having to wait for the attendance of an operating engineer. Duplicate feeders, consisting of a six-wire line, will generally satisfy these conditions, but there is a danger of a major fault such as a tree being blown across the lines or a burnt wooden pole affecting both lines.

It is impossible to plan a scheme, at a reasonable cost, so that no matter what happens a consumer cannot be isolated for more than a minute or two, but by the exercise of care in planning, such a thing as a shut-down lasting hours or even a day would be rare. Adequate means for sectionalising the feeders by means of suitably placed switching stations will contribute to the flexibility of a system on those occasions, where more than one of the permanent type of faults have developed as the result, say, of a severe electrical storm over the area.

The ring main would give the necessary service to the class "B" consumer, where the restoration of supply must wait until the operating engineer has first located the section of the ring containing the fault, and has then carried out the switching necessary to isolate this section and make the rest of the ring alive. In some exceptional circumstances there may be two faults on different parts of the ring, which will cause a lengthy shut-down of one or more consumers, but this is a risk which must be taken. It may only occur once in many years, and the class "B" consumer would only suffer inconvenience without monetary loss, as might be the case with some of the class "A" consumers.

The class "C" consumer only merits the cheapest possible equipment, and duplicate supplies need not be provided. Cheap spur lines and single-way switching will satisfy all his requirements.

Any area to be electrified will not fit exactly a standard plan, but for the purpose of briefly considering the method of planning, the idea, which has been employed before, of considering a "model area" is useful. The area to be considered will be large enough to need a system of 33-kV transmission lines with secondary systems connected thereto operating at 11 kV. Such an area will contain examples of planning suited to smaller areas. The simplest general form for the main transmission system is that of a wheel with spokes and a rim, radial feeders forming the spokes, and an outer ring feeder forming the rim. The diameter of the rim would be less than the diameter of the area, so that the outer limits could be reached by the secondary lines. The general shape of the wheel will be distorted to enable the main transmission lines to pass through some of the important class "A" consumers, and through points at the centres of gravity of load to be supplied by secondary systems. It is intended to confine this article to consideration of the design of the 33-kV main transmission scheme.

Protection

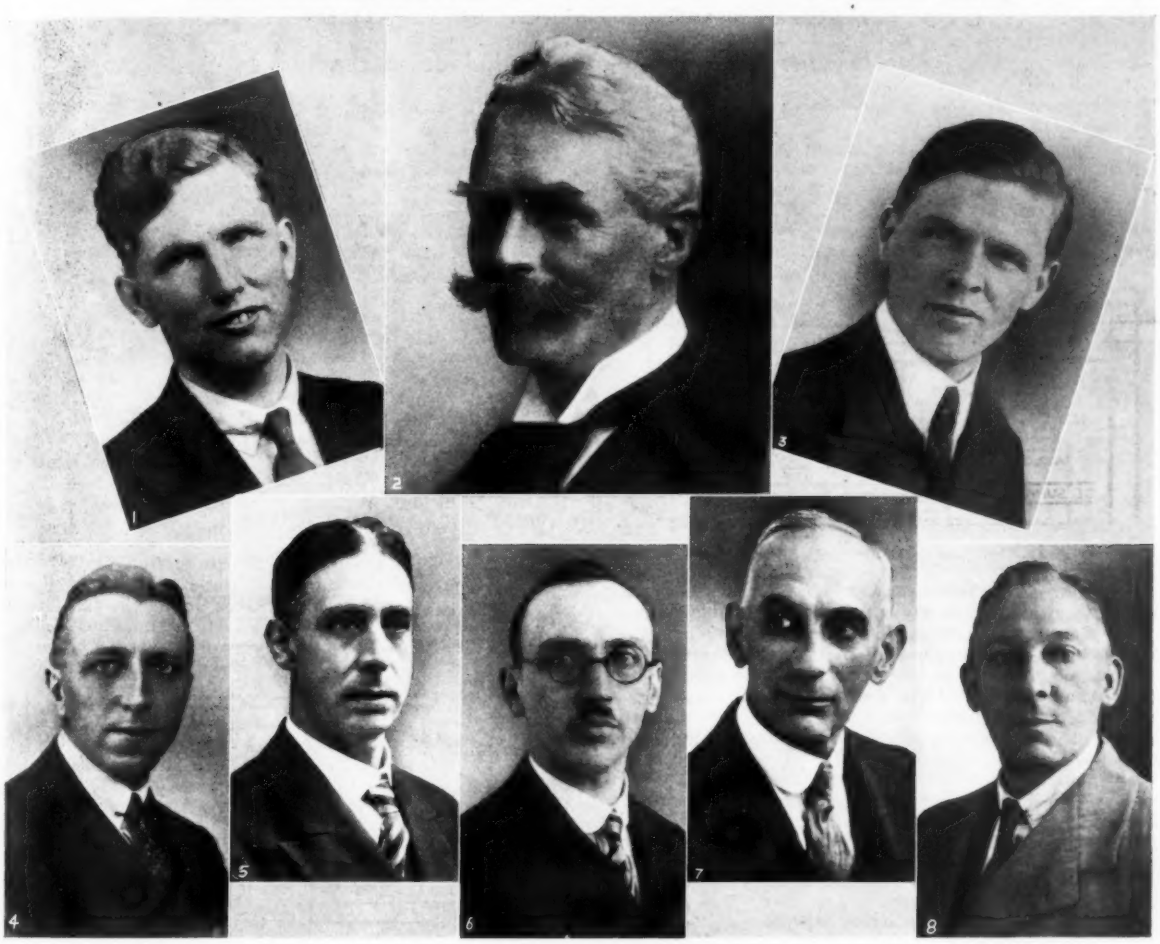
Assuming the area to be mainly rural, as distinct from industrial, considerations of capital outlay will prohibit a comprehensive scheme of discriminative protection throughout the system, as this would necessitate the wholesale use of 33-kV oil-immersed circuit breakers with expensive auxiliary apparatus. It will be practicable to provide automatic switchgear only at the starting point of each radial feeder, and the system will be operated by sectionalising the outer ring main and connecting the various portions to the appropriate radial feeders. Thus a fault on any radial feeder, or on the portion of the outer ring connected to it, will operate the feeder switch at the starting point of the feeder. Such an arrangement is perfectly sound provided that: (a) the feeder switch is reclosed within a few minues, and in the probable event of the fault being of the transient type supply will be restored with little inconvenience to any consumer; (b) a duplicate supply can be resorted to by the class "A" consumers if the fault is of a permanent nature; (c) a sufficient number of non-automatic line switches suitably placed are provided to make it possible to isolate a faulty section and restore supply to other consumers within the time taken by the operating staff to locate the faulty section, and do the necessary switching.

With regard to the protective devices to be used on the feeder circuit breakers, it will be assumed that the system is three-phase with an earthed neutral. The only neutral to be earthed will be that of the star-winding of the step-up transformer supplying the system, or that of a neutral reactor or its equivalent connected to a step-up transformer which may have a delta winding. Overload or overcurrent protection will be an obvious minimum requirement, but it is most necessary to consider whether earth-leakage protection can be omitted with safety.

Earthing Regulations

Regulation 17 of the Electricity Commissioners' Overhead Line Regulations (E1.C.53) emphasises the importance of the matter. After calling for adequate means to render a line conductor dead in the event of its falling due to breakage or

Some Driving Forces in the Industry: Marryat & Place



1. Mr. John Marryat. 2. Mr. H. Marryat (*Elliott & Fry*). 3. Mr. Robert Marryat (*Jerome, Ltd.*). 4. Mr. J. G. Cant (*E. Carver*), manager, Maintenance Department. 5. Mr. A. F. Goodwin (*Wright & Sons*), Lighting Department. 6. Mr. G. A. Wedge (*Jerome, Ltd.*), Lighting Department. 7. Mr. H. Willmer, Power Department. 8. Mr. W. A. Matthews (*Jerome, Ltd.*), Contracts Department. (See note on page 826.)

Rural Electrification (*Concluded from opposite page*)

otherwise, it permits two methods of earthing " all metal work other than conductors." Either a continuous earth wire must be installed and connected with earth at four points in every mile, or an effective earthing device must be provided at each pole. " The design and construction of the system of earth connections shall be such that when contact is made between a line conductor and metal connected with earth the resulting leakage current shall not be less than twice the leakage current required to operate the devices which make the line dead."

Where a continuous aerial earth is provided a minimum value of the earth current which would flow as the result of contact between conductor and earthed metal on the pole farthest out from the source of supply can be calculated. It is the minimum value because the calculation will ignore the unknown value of the parallel earth return paths provided by each earth plate connected to the aerial earth over the whole route. So in this case the regulation can be met by designing protective gear to suit, although the case of a line breaking and coming into contact with the ground without making contact with earthed metal remains a matter for speculation rather than calculation.

In cases where it is possible to comply with the quantitative part of this regulation by omitting earth-leakage protection, compliance with the quantitative part of the regulation can only be attempted by including leakage protection. When the aerial earth is omitted, and the alternative of earthing at each pole is adopted calculation of earth currents is impossible. Any one earth plate on the whole of the route is completely independent of all others, and it is more than likely that some of them will be in ground having relatively high electrical resistance.

Feeder Switchgear and Transformers

The 33-kV supply for the transmission system will probably be obtained from an existing supply station already serving an industrial area at 6,600 or 11,000 V. The switching and transforming arrangements for " stepping-up " will largely depend on local conditions, especially in regard to the question as to whether there is space to install the necessary equipment where it is needed. For the purpose of comparing different methods of dealing with the matter, it will be assumed first that ground space is available on the station site, and that overhead conductors can be run from the station site.

The most straightforward arrangement would consist of installing two or three transformers to step-up to a 33-kV bus system. The type of switchgear for the l.v. side of the transformers would be decided by what is already in use in the station, but the 33-kV switchgear for both the transformers and the outgoing feeders may be decided on merits of cost and convenience. On the score of both cost and convenience the best arrangement will be to install the transformers and the whole of the 33-kV switchgear out of doors in a sub-station similar in miniature to the grid transforming stations dotted about the country.

The automatic circuit breakers will be of the oil-immersed type, while all isolating switches will be of the " gang-operated " air-break type. The oil circuit breakers would be electrically operated from a control board in the station building, and the automatic equipment of the feeder switches will comprise relays for overload and earth leakage, preferably of the definite minimum time limit type, permitting adjustment to delay operation to allow protective devices on the various step-down transformers to clear their troubles. The transformers are the main channel for the whole of the supply, and will operate in parallel. Merz-Price transformer protection should therefore be installed on each to provide discriminative protection. Definite minimum time-limit relays should be included in the equipment of the l.v. transformer switches in preference to using overload fuses on the Merz-Price gear.

Merz-Price protection will make it impracticable to employ " on-load " tap-changing equipment on the transformers, but the " bunching " of the feeders on to a common bus system depreciates the value of such equipment. Where individual feeder adjustment cannot be made, it will be better to maintain a constant bus-bar voltage. Tappings should be provided for " off-load " operation to adjust the transformation ratio to get the best average conditions for both the 33-kV supply and the existing l.v. supply.

Motor Protection. By C. L. Lipman, A.M.I.E.E.

A relay for large direct-started induction machines

THE modern tendency in super-power station practice is to switch on large induction motors direct to the mains without special starting gear. In providing automatic overload protection for direct-started motors it is necessary to prevent the circuit breaker operating due to the initial rush of current during the starting period, which, in the case of large induction motors, may extend over several seconds, the starting current being several times the normal full-load current; to provide protection against faults during the starting period; to guard against stalling during the running period; and to give normal overload protection during running.

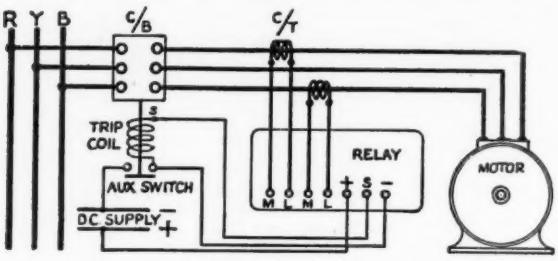


Fig. 1.—The protection of three-phase motors

A new relay, which has been specially designed to fulfil these requirements, has been installed in large numbers at the latest super-power stations for the protection of the large direct-started motors driving important auxiliaries. The apparatus consists of four component elements, a starting timing device, normal overload relays having an inverse time lag with adjustable definite minimum time characteristics, excess current devices with instantaneous action, and auxiliary contactors for changing over the connections within the relay case. The method of external connection is shown in fig. 1; the internal wiring is illustrated diagrammatically in fig. 2, and fig. 3 is a general view of the relay.

How the Relay Operates

The timing device T (fig. 2) consists of a d.c. motor F, driving an adjustable lever *t* through an electrically operated clutch K-*f*. The starting time settings are adjustable from 0 to 30 seconds in steps of 2½ seconds in accordance with the starting time characteristics of the induction motor to be protected. The timing device is started by an auxiliary switch in the oil switch handle gear (see fig. 1) arranged to close when the main oil circuit breaker closes, and to open when the main oil circuit breaker opens. The time delay on scale T is so selected that the inverse time element overload relays are not in commission until shortly after the protected motor has attained running conditions.

Two normal overload relay elements with inverse time lag are provided, one in the red phase and one in the blue phase. Each element consists of an induction type driving electromagnet POI with current-setting attachment (see fig. 3) and a contact actuating geared device DA*d* with time-setting attachment. The main coil P is permanently connected to the secondary winding of a current transformer and becomes energised immediately the oil circuit breaker is closed, thus circulating a flux through the U-shaped electromagnet O in proportion to the current flowing to the motor; a turning moment will be exerted upon the pivoted aluminium drum D driving the geared device *d* by the combined action of the flux due to coil P and another flux in quadrature therewith due to coil I when the circuit of the latter coil is completed at the contacts R and B of the change-over contactor U when energised.

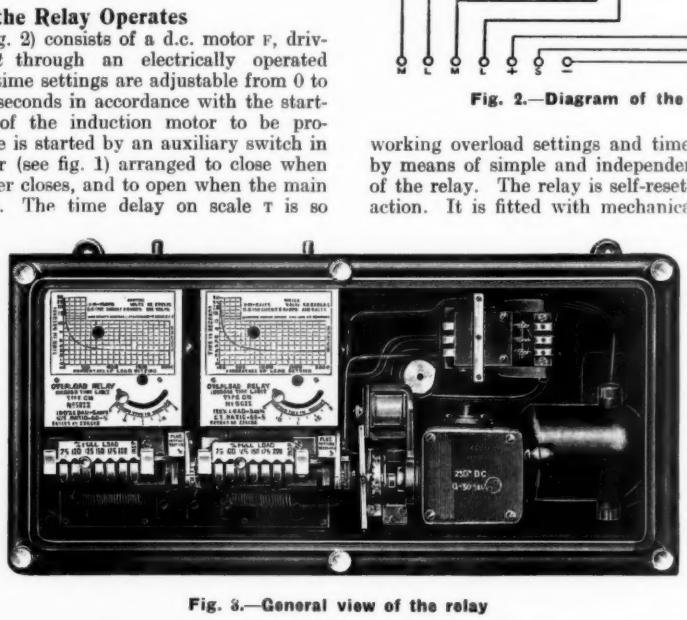


Fig. 3.—General view of the relay

Overloads and Excess Currents

The normal overload relays are provided with current settings adjustable between 75 and 200 per cent. full-load current and with time settings adjustable between 0-25 seconds maximum or 0-2 seconds definite minimum time lag. In addition, each overload element is fitted with an instantaneous excess current attachment C, which consists of an auxiliary armature of magnetic material pivoted close to an air-gap in the core of the main electromagnet O and is actuated by the main flux due to the coil P. The excess current instantaneous devices are calibrated in terms of multiples of the normal current settings, the range of adjustment, on scale E, being from two to six times the ordinary plug setting. The instantaneous excess current features are in commission irrespective of the operation of the timing device and give speedy release of the motor in the event of the current exceeding the normal short-circuit current by more than, say, from 15 to 30 per cent.

It will be noted that the winding of the change-over contactor U is energised from the auxiliary d.c. supply, initially through the contacts V which close at the end of the stroke of the timing device T*t* and then, *i.e.*, during the running period, through the self-sealing contacts H. This allows the windings F and K of the timing device to be de-energised by opening the contacts J when the motor is running. A separate earth leakage relay is provided to take care of earth faults as usual.

Instantaneous Disconnection

It is claimed that by the use of this relay a faulty motor is disconnected instantaneously, either during the starting or the running period. A motor stalled during running is disconnected with a time delay of the order of one second. Normal working overload settings and time settings are accomplished by means of simple and independent adjustments on the face of the relay. The relay is self-resetting and fully automatic in action. It is fitted with mechanically operated hand replaceable flag indicators to show which element has operated. It is housed in a dustproof case suitable for installation in the boiler house. Finally, it enables considerable economies to be effected in the cost in installation of large induction motors, as it eliminates the need for any special starting gear.

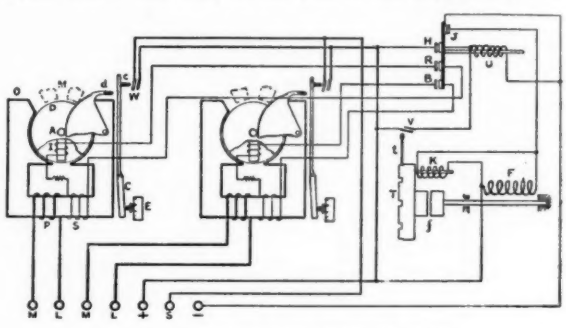


Fig. 2.—Diagram of the internal wiring

The relay is equally suitable for the protection of three-phase and two-phase motors of any horse-power and voltage. The ratio of transformation and the degree of primary insulation of the current transformers are adjusted accordingly. The power consumption of the windings of the relay is about three volt-ampères at full load; therefore, it is only necessary to use ordinary current transformers of small output. The relay can also be adapted for the protection of single-phase motors in which case only one over-current element is required.

The author thanks Messrs. Nalder Bros. & Thompson, Ltd., for permission to publish the foregoing information.

A Survey of British Water Power

The British Association is to undertake an inquiry into the position of inland water survey in the British Isles and the possible organisation and control of such a survey by a central authority.

A CONFERENCE ON COOKERS

TWO papers dealing with electric cookers and cooking development were presented anonymously at the E.D.A. conference at Caxton Hall, Westminster, on Friday last week. One paper was written by a manufacturer, and the other by a supply engineer—both were read by Mr. V. W. Dale, business manager of E.D.A. Mr. C. H. Cox, chairman of the E.D.A. Council, presided, and he was supported by Mr. A. C. Cramb, the director and secretary. There was one thing common to both papers—the authors both wanted standardisation of cookers to a very few models. The manufacturer asked for two, and the supply man three.

The interests of the supply engineer and the manufacturer are identical, claims the maker, who suggests that it is ridiculous that the engineer should be credited with having foibles and fancies of his own. A strong plea is made for united concentration on the production of an efficient, cheap cooker which will give a minimum of trouble to the consumer and the supply undertaking. In the British standard cooker ambition carried the manufacturer responsible too far. It would have submerged the individuality of manufacturers and given no scope for initiative or development.

By standardising upwards in sizes with only a few models the manufacturer would guarantee that the cooker, once installed, would be adequate for any normal requirements of the home, and that stocks would be materially reduced. And prices would be standardised downwards. Broadly, the ideas as to size, &c., of the two cookers are that given one with a 14-in. oven, one hot-plate, and a boiler-griller, and the other with a 16-in. oven, two hot plates, and a boiler-griller, there would be no ground for the objection that a larger cooker than was actually required would mean unnecessary expenditure of energy.

In manufacturing shops for the past five or six years there has been absolutely no continuity of production, and every manufacturer is trying to cap the efforts of his competitor by producing a cooker which differs from that of his rival in some very minor point.

The fundamental considerations for cooker production are: actual dimensions of the oven cooking space; the number of hot-plates for a cooker of a given oven capacity; whether the plates are to be round or rectangular; whether grills are to be combined with hot-plates or to be separate; whether front ventilators or back vents are required; mercury thermometers or heat indicators; whether all cookers should be vitreous enamelled both inside and out, or whether stainless steel interiors are required.

It is for engineers to agree on fundamentals and then to accept only cookers designed to the agreed specifications.

What the Supply Engineer Thinks

Before the supply industry is in a position to tell manufacturers what they should do it should put its own house in order by generally adopting suitable hiring schemes, tariffs and propaganda. Manufacturers should do their share in educating the public and adjust cooker design so that it would be permanently satisfactory to the engineer and housewife, and provide adequate spare-part service. E.D.A. has a most important part to play in connection with publicity, and the supply and manufacturing interests should collectively provide the necessary funds.

The supply industry is still not satisfied that manufacturers have provided a cooker that will not become obsolete at an early date, and will not involve the supply industry in costly maintenance during its seven years or so of life. A difficulty confronting the supply engineer is the possible obsolescence of a cooker before the loan or normal depreciation period has expired, together with the demand from the consumer using it for a later model. But for the special circumstances the resultant financial aspect would be very unsatisfactory. Cookers purchased four or five years ago have cost, and are costing, on the average up to £2 per annum for maintenance, and if this state of affairs is not drastically altered the manufacturers will be unable to look to the supply industry to develop this phase of their activities.

The author almost apologises for referring to hot-plates, and says that far too much fuss has been made of their alleged ineffectiveness with regard to water boiling. Having produced a hot-plate which, with special utensils, will boil two pints of water in eight minutes, the industry has little to worry about. Manufacturers should supply at least one properly designed utensil as part of the cooker equipment, and consumers should be able readily and cheaply to obtain such utensils through the usual hardware stores.

Various Opinions

The discussion was long, keen, and, on the whole, good. Many of the problems discussed, said Mr. Veitch (Hague & McKenzie, Ltd.), would dissolve if three times as many cookers were sold, and one way to increase sales was to remedy the methods of demonstration. Too much attention was given to the oven, and not enough to the hot-plate.

Miss Norvick (E.A.W.) agreed that adequate demonstration was essential to bring about increased sales, and every undertaking should have its own demonstrator who could command the confidence of the consumer. The supply undertaking demonstrator's job was different from that of the manufacturer's demonstrator. Nearly all cooking consumers wanted hire facilities. Mr. Clayden said that the supervision of cooking development of any one undertaking should be a whole-time job for one man. Several speakers thought the biggest drawback to increased sales was high cooker rentals, and Brig.-Gen. R. F. Legge (British Power & Light Corporation) suggested that hire and installation charges might be incorporated in the energy rates. But Lt.-Col. H. W. Watts (Epsom) thought that this would not do, because the rental should be thoroughly understood by the consumer. The weekly wage earner who did her own cooking was the best possible type of cooking consumer.

Mrs. Rowe (Belling, Ltd.), speaking as a manufacturer's demonstrator, commended a scheme which she had found in Yorkshire in which the hire charge was incorporated in the kWh charge, but on a definite basis, which provided for the hire recovery in the sale of a given number of kWh sold. Mr. F. H. Howell (Domestic Electrification, Ltd.) and another speaker both referred to the 15s. per quarter hire charge as ridiculously high, the former speaker contending that the only way out of the difficulty was to get longer loan periods, while the latter suggested that the supply undertaking should carry some of the charge. At 7s. per quarter many more thousands of cookers could be installed. Gas undertakings put in pipes free.

Maintenance Costs

A number of speakers referred to maintenance costs as being responsible in varying degree to lack of progress, although nearly all thought that the figure of £2 given in the supply engineer's paper was above that generally experienced. Mr. T. G. Leith (General Electric Co., Ltd.), who said that sheet metal construction was quite satisfactory if it were enamelled, put the maintenance figure for good cookers at under 10s. per year. Lt.-Col. Watts (Epsom) said that most of the trouble was with the body of the cooker, and could be overcome by a back vent. He quoted 11s. 11d. per year maintenance cost for the oldest models used by his undertaking; others cost only about six shillings. Sheet-iron was easy to repair, and enamelled cookers should only be hire-purchased or sold for cash.

Mr. W. A. Turnbull, Aylesbury, was enthusiastic; he stated that he had been able to show his committee that although there was a considerable loss on the repairs bill, there was a recompensing profit on the sale of electricity for cooking at 1½d. and 1d. per kWh; they were making a good thing out of cooking. Mr. S. C. Hurry (Jackson Electric Stove Co., Ltd.) was all for selling energy at a reasonable price, and Mr. Bamford (Croydon) said that the price of energy should depend a great deal on the price of gas in the locality. Any unwillingness on the part of the undertaking to develop cooking retarded progress in other directions, to the benefit of the competitor.

Is Mass Production Possible?

There was much condemnation of the suggestions for standardisation and mass-production for diverse reasons. Mr. F. H. Howell and Mr. McKenna said that any attempt at mass-production with anything like the present output of cookers in this country, less than 100 per day, was hopeless. Mr. F. E. Selly (Marylebone) had been told by a new mass production organisation that a suitable press for cooker work would cost £80,000. He thought that the personal touch, which would be lost under mass production, had done much to advance electric cooking. The gas industry had many more than two cookers.

Mr. Logan (Aylesbury) considered that there could be no mass production until there was effective co-operation between the supply engineer and manufacturer, and Mr. Bamford thought it was impossible to standardise because of the space restrictions, etc., in kitchens. Miss Brice (Beckenham), who advocated three cookers only, took an unusual, but obviously approved line in calling off her own bat for a vote of the demonstrators present. There were 26 votes for three cookers and nil for two; 26 votes for boiler-grillers and 13 for separate grills; and 26 votes for "de luxe" cookers. She wanted the standard cooker (black) only for hiring because it could be reconditioned cheaply.

Co-operation Essential

Mr. Vale, G.E.C., supported standardisation with a few models, which, he said, would remove the manufacturers' difficulties. He strongly urged co-operation between the supply and manufacturing interests. There was a clear case for it because both parties agreed that the present design was not what it might be, and both wanted a bigger cooker output. The special utensil question was also discussed. Mr. Veitch said the time had arrived when the authority should be asked to introduce the right type of pan. Manufacturers should not supply it, and the electric kettle did not solve the problem. Mr. Selly said that to condemn a consumer's old utensils was a bad move. He favoured a gentle hint that a bad utensil would be uneconomical. Mrs. Robinson (E.D.A.) and another speaker agreed that the present price of special utensils was generally prohibitive. The latter is evidently a believer in psychological effect in that he said that red heat (the open plate) was the thing to make electric cooking go.

The Rapid Charging of Accumulators

IN a recent issue of *Elektrotechnische Zeitschrift*, Dr. A. E. Lange makes out a good case for the constant-voltage system of charging accumulators. The data given below relate to cells of the same type charged by three different methods, *viz.*: (1) constant current, usually restricted to small cells; (2) graded current, as usually applied to traction batteries and large stationary batteries; (3) constant voltage, as now recommended for batteries for rail or road traction.

The tabulated data show the applied voltage per cell and also the ampère-hours (Ah) returned to the cell at stated periods in the charge as percentages of the Ah withdrawn during the preceding discharge, which, unless stated to the contrary, is assumed to have been at the five-hour rate. During constant-current charging, a rapid rise in voltage occurs from about 2.4 V, owing to gassing; up to this point, the electrical input is utilised almost completely for the electro-chemical changes of recharging, with the exception of a slight heating of the electrolyte, but beyond 2.4 V losses occur owing to the electrolytic dissociation of the water. When charging at the five-hour rate, from 80 to 87 per cent. of the discharged Ah is returned by the time the gassing voltage is reached. The remainder of the input must be at higher voltage and with increasing loss of energy until a 10 per cent. overcharge is completed in about 5½ hours.

Some Considerations

Though a certain amount of overcharging is necessary, in order to maintain the capacity of the cells, the economy of operation is greater the less the amount by which the voltage exceeds the gassing voltage, and the shorter the time during which it does so. For example, in the case of charging by the graded current method, a relatively heavy constant current is used until 2.4 V per cell is reached, thus returning about 85 per cent. of the Ah to the cell in three hours, compared with about 4¼ hours in the case of constant-current charging. At this stage, the voltage per cell is kept constant

TABLE 1.—CHARGING WITH CONSTANT AND WITH GRADED CURRENT.

		Start.	1 hr.	3 hr.	4 hr.	5 hr.	6 hr.
CONSTANT CURRENT	Voltage, per cell	2.15	2.17	2.22	2.32	2.8	2.8
	Current, amps.	220	220	220	220	220	220
	Per cent. recharge* ...	0	20	60	80	100	120
GRADED CURRENT†	Voltage, per cell	2.2	2.2	2.4	2.55	2.7	2.7
	Current, amps.	300	300	300	75	75	75
	Per cent. recharge* ...	0	28	85	102	109	116

* As per cent. of Ah output during previous discharge.
† The voltage per cell being held constant at 2.4 V from 3 h. to 3h. 45 m., the current decreases from 300 A to 75 A.

until the current falls to one-quarter of its initial value, after which the charging is finished at constant current, the pressure rising to 2.7 V per cell (see Table 1). This method of charging is largely used with entirely satisfactory results, the exact gradation of current being varied to suit requirements. On the other hand, continual supervision of current and voltage conditions is required unless they are regulated automatically, and four to eight hours is needed for a complete charge.

In the constant-voltage method of charging, a voltage per cell equal to, or slightly in excess of, the gassing voltage is applied from the commencement and held constant throughout. The initial current rush is very heavy, and theoretically may be from ten to fifteen times the normal charging current for a very short time, but it is reduced by the polarisation voltage of the accumulator and by the ohmic resistance of the supply leads and connections. Tests show that the initial rush of current into a fully discharged cell is about six times the normal charging current and does not persist long enough to endanger either the leads or the plates.

By the temporary insertion of a ballast resistance or similar means, the generator voltage can be reduced and then raised from the open-circuit battery voltage to 2.4 to 2.5 V per cell in about 1 min. A battery of the same type, fully discharged and then recharged at a constant terminal voltage of 2.5 V per cell, gives the results shown at (a) in Table 2.

TABLE 2.—CONSTANT VOLTAGE CHARGING.

		Start.	10 min.	20 min.	40 min.	80 min.	120 min.
	Voltage/cell ...	2.5	2.5	2.5	2.5	2.5	2.5
(a)	Current, amps. ...	1,400	1,000	950	810	300	52
	Per cent. recharge	0	16	31	59	95	103
(b)	Current, amps. ...	1,300	1,180	1,150	850	100	50
	Per cent. recharge	0	21	41	77	107	111

The losses by heating and gassing amount to from 3 to 4 per cent., so that the Ah efficiency of the charging operation is from 97 to 96 per cent. Also, the Wh efficiency is considerably higher than by the other methods of charging, because there is no charging at 2.5-2.75 V per cell. If the cells are only two-thirds or one-third discharged, they can be fully charged by this method in 90 or 70 min. respectively.

Tests were made recently on a 168-cell battery of the Accumulatoren Fabrik A.G., as used on more than 100 rail motors of the German Reichsbahn for a range of about 186 miles. The rectifier used was overloaded to the extent of 30 per cent. during the first part of the charge, but no difficulty was experienced. The cells were first heavily discharged at the two-hour rate, to the extent of 932 Ah, and were then charged as shown at (b) Table 2. Automatic charging on this system can be arranged by means of a time switch, minimum cut-out, or contact-making Ah meter. Once a week or fortnight the battery should be brought up to 2.75 V per cell by a topping charge at relatively weak current, particularly in the case of batteries for rail motors, shunting locomotives, battery trucks, and the like, which receive many partial charges in ordinary service.

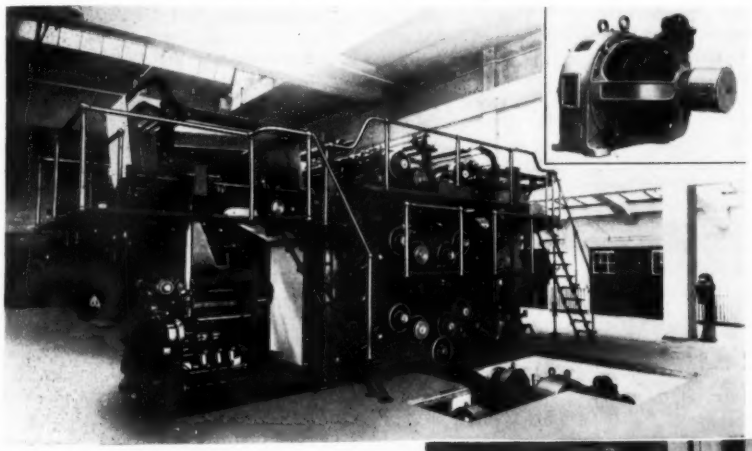
The Electrical Engineers' Ball

As stated in our issue of October 28th, p. 654, the Electrical Engineers' Ball will be held at Grosvenor House, Park Lane, W., on February 17th next, the day after the annual dinner of the Institution of Electrical Engineers, and will be on the same lines as those of the previous balls. The times are:—8.30 p.m. for 9.0 p.m.; supper, 11.30 p.m.; carriages, 3.0 a.m. Tickets are now available and will, as in the past, be obtainable, price one guinea each, from members of the general committee, which is composed of members of the former Ball Committee and of the I.E.E. Benevolent Fund Committee, under whose auspices the ball is now being managed.

Rotary Printing Machinery. By C. H. S. Tupholme

Some typical applications of electric control apparatus

SMALL rotary presses driven by d.c. motors, such as rotary web presses for printing magazines and small newspapers, usually require a single-motor drive, and standard, adjustable-speed, commutating-pole motors can be connected to the press shaft by either pulleys and belt, direct gearing, or silent chain. In addition to the usual starting, stopping, inching and speed-regulation features, the control gear must provide a crawling speed when the paper is being threaded through the rolls and also when the machine is being cleaned and adjusted. As a general rule one or more push-button stations are fixed on the press.



A Hoe rotary press driven by an a.c. commutator motor

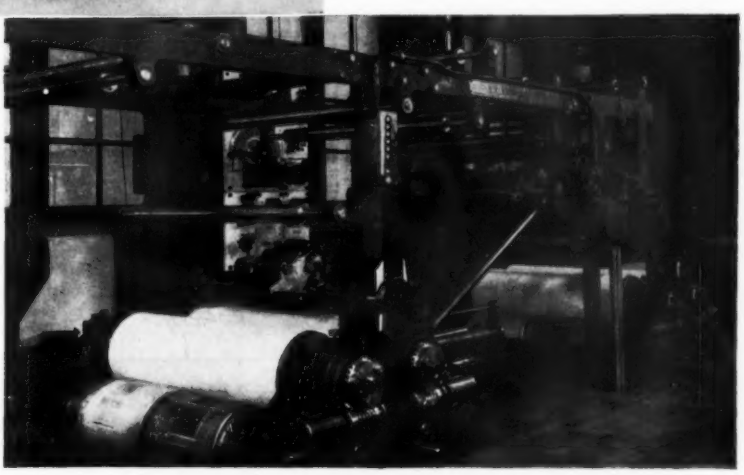
A typical example of this drive is the Igranic compensated solenoid crosshead type self-acting controller, which, to obtain the crawling speed, incorporates contactors and resistances. The low speed is secured by a suitable combination of resistances partly connected in series and partly in parallel with the motor armature. If a simple series resistance is used alone, undesirable fluctuations of the motor speer occur, the speed being largely dependent upon the load conditions. Further, the large amount of resistance required to produce the crawling speed would so limit the current on the first contact that the motor would be unable to start against its load; in order to start the motor several steps of resistance would have to be short-circuited and then reintroduced to check the motor speed. For these reasons a parallel or diverter resistance is incorporated in the control system to ensure a slow uniform crawling speed.

The push-button station for this control system is marked "Start," "Inch," "Speed up," "Slow down," and "Stop."

A single-motor d.c. drive; control panel on right

Momentary pressure on the "Start" button causes the main and diverter clapper switches to close, thus permitting current to flow from the line through the series resistance and thence through the motor armature and diverter resistance, which are connected in parallel. This current starts the motor, which continues to crawl while the paper is being threaded through the rolls. Having finished this operation, the machinist presses the "Speed up" button and the control panel responds by opening the diverter circuit and gradually removing the series resistance by the upward movement of the solenoid-operated crosshead member, thus bringing the motor up to normal speed. Continued pressure on the "Speed up" button allows the crosshead to fall slowly, inserting resistance in the motor field circuit and increasing the speed above normal. Upon releasing the button the movement of the crosshead ceases, leaving the motor running at the speed attained.

By pressing the "Slow down" button the field resistance is slowly short-circuited by the upward movement of the crosshead, thereby reducing the speed. Special means are incorporated whereby the crosshead is caused to stop and remains where it rests when the "Speed up" or "Slow down" button is released. Inching is obtained by alternately pressing and releasing the "Inch" button. If this button is held down the motor runs at crawling speed. Under all conditions the "Stop" button is



The "Mascord" system applied to a large rotary press

the master. Positive no-volt protection prevents the motor from restarting when the supply is re-established after a voltage failure.

Single-motor Systems

For the smaller a.c. motor-driven presses polyphase single-motor equipments are applicable. Where close control of the speed is of primary importance, the a.c. variable-speed commutator motor is excellent. With this unit an extremely wide range of speed is obtainable and, further, due to the inherent characteristics of the motor, the power input is at all times proportional to the output; if the press is in continuous operation the higher initial cost of the motor equipment will be offset by the saving in power. Push-button contactor starting gear is available for this class of service, speed variation being obtained by manual control of the motor brush-shifting gear. Alternatively, a non-automatic starter can be employed. In either case emergency stop buttons should be installed on the press.

When the press is used only intermittently and low initial cost is important, a slip-ring induction motor can be used, speed control being obtained by varying the resistance in the rotor circuit. This equipment does not give the same fine speed regulation, independently of the load, as the a.c. commutator motor, but is quite serviceable for intermittent work.

Another form of controller for a.c. slip-ring motors on this class of work is the "Igranic Pre-set," by means of which starting, stopping, and inching are accomplished by the use of a primary magnetic switch and a push-button master switch. A secondary contactor switch cuts in the starting resistance for either starting or inching. One or more additional secondary contactor switches are fitted according to the

size of the motor; these operate under the control of a timing relay for cutting out the starting resistance step by step and inserting the regulating resistance when running up to printing speed. This regulating resistance is connected to the three-arm rotor regulator, so that the speed attained by the motor after each start corresponds to the position of the regulator.

For large rotary presses the double-motor equipment is popular, consisting of a variable-speed commutator motor for the main drive with an induction motor for the barring gear, the two forming a complete power unit on one baseplate. The main motor gives a speed range of three or four to one, depending upon the requirements of the press. The speed of the motor is regulated by brush-shifting gear which is operated by a pilot motor controlled by push-buttons. The squirrel-cage or slip-ring motor driving the barring gear is used for inching or to give a steady and continuous creeping speed when feeding in the paper.

Variable-speed A.C. Motors

The three-deck 12-page Hoe rotary printing press illustrated is driven by a B.T.-H. 70/23 h.p., 790/250 r.p.m., three-phase a.c. variable-speed commutator motor. The press is started by the barring motor, and as soon as this motor reaches its highest speed, the main motor takes over and acceleration of the press is continued until the desired running speed is reached. By means of a free-wheel coupling the worm gear and barring motor are automatically thrown out of action as soon as the main motor has taken over the load. When the main motor starts, it automatically shuts off power to the barring motor, which then stops.

The chief components for this equipment are all mounted on a complete panel and include the following gear: for the control of the barring motor, a triple-pole line contactor for the stator circuit; a triple-pole thermal type over-current relay, arranged for manual or electrical resetting; a double-pole, double-throw, change-over switch to enable the barring motor and gears to be run light in a reverse direction in cases of emergency while the press is "backed out" by hand; two control circuit fuses to afford protection against faults in the control wiring and push-button circuits. For a slip-ring barring motor a solenoid, self-resetting overload relay is used; the main motor is prevented from starting, when the barring motor is reversed, by electrical interlocking between the reverse switch and the contactor involved. A relay also prevents the main-motor line contactor from closing until the barring motor is up to speed.

The main-motor control consists of a triple-pole line contactor for the primary circuit of the main motor; two mechanically interlocked double-pole contactors forming a reversing unit controlling the brush-shifting motor; a time-delay relay to ensure that when the main motor has taken over the load from the barring motor, the acceleration of the former will not begin until a predetermined time interval has elapsed, and three main over-current relays which, after operating, will reset automatically, so that the equipment can be restarted.

Electrical Interlocking

Auxiliary contacts, interlocked electrically with the control of the line contactors, ensure that the circuit is always broken on the contactor contacts and not on the switch blades, should the latter be opened when the press is running.

The ironclad push-button station has six buttons, "Raise," "Lower," "Inch," "Stop," "Off," and "On." When the "Inch" button is pressed the barring motor drives the press at low speed until the button is released. This button is covered by a flap which is interlocked electrically so that no other operation can be carried out until the flap is restored to its position over the inching button. If the press is to be run for a few minutes at low speed without the necessity for holding down the inching button, a momentary depression of the "Raise" button will ensure this. If the "Raise" button is pressed again after this, the main motor takes over the load and increases the speed to the desired maximum. If a reduced running speed is desired the "Lower" button is pressed and held down until the required speed is reached, when the button is released. The whole equipment is immediately shut down on pressing the "Off" button.

To secure rapid stopping of the press, d.c. controllers can be arranged for dynamic braking, while magnet-operated shoe brakes can be fitted to the driving units in a.c. installations.

Synchronous Operation

For certain combinations of two presses, which are sometimes driven independently and at other times together as a single press, two control panels can be operated simultaneously and in synchronism from one push-button station. The "Mascord" system for large rotary presses is a complete driving and control unit consisting of a single compound-wound variable-speed d.c. motor, with two magnetic clutches (for low and printing speeds), double reduction spur gearing; a free-wheel automatic mechanical clutch to enable the high speed clutch, when switched in, to overhaul the run away from the slow speed clutch, thus accelerating the press to printing speed; and the driving shaft, which carries a pinion for meshing with the driving wheel of the press. The system is controlled by a fully automatic motor-driven starting and speed-regulating panel controlled by an eight-button station.

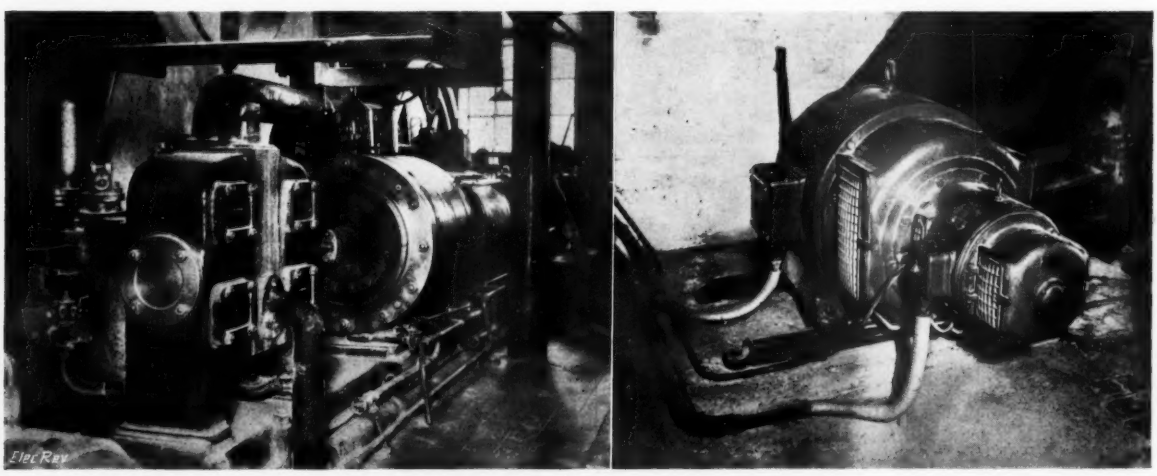
Flour Mill Electrification

THE flour mill of Messrs. R. N. Smith, Ltd., at Little Parndon, in Essex, is situated on the picturesque banks of the River Stort. There is some evidence that the mill was in early times worked by an undershot water wheel. More recently the power was supplied by a steam engine, until it was recently superseded by electric motors.

The installation comprises a 55-h.p. auto-synchronous slip-ring motor for the main drive, a 15-h.p. induction slip-ring motor for the stone dressing plant, two 10-h.p. slip-ring motors for the dry cleaning of wheat, and a 5-h.p. s.c. direct-on started motor for the wet cleaning of wheat. All machines are of the Crompton-Parkinson drip-proof type without special provision against the entry of flour dust.

The main driving motor is coupled to the original mill shaft by a Hans Renold chain drive; this motor also corrects the power factor for the whole installation. The mill-owners are enthusiastic regarding the service rendered by the new system, owing to the cleanliness, regularity of operation, and cessation of stoppages for repairs, and boiler cleaning, &c. The saving in space is very noticeable. The superseded engine and boiler occupy 600 ft., whereas the whole of the electric motors take up only 150 sq. ft.

Mr. C. R. Marshall, resident engineer of the North Metropolitan Electric Power Supply Co., at Hertford, was responsible for the layout of the complete electrification scheme. Three-phase energy at 415 V is supplied by the company.



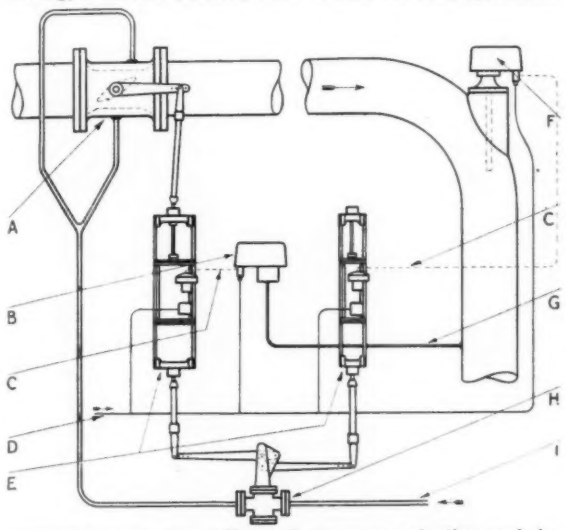
Saving space by changing over to electric drive. On the left is the superseded steam engine, the right-hand picture showing the 55-h.p. Crompton Parkinson motor now used for the main drive

Steam Generation Control

A pressure-reduction and de-superheating system

THE "Hagan" system of steam pressure reduction and de-superheating has already been installed in a few power stations and many industrial works in this country. Modifications have been made progressively to the equipment, and the following is a description of it in its latest form.

In the combined system (pressure reduction and de-superheating) a venturi butterfly valve is used for both operations.



Arrangement of the "Hagan" pressure reduction and de-superheating system

A, Venturi valve; B, pressure regulator; C, relay air; D, power air supply; E, power pistons; F, thermostat; G, steam connection; H, water-control valve; I, water supply.

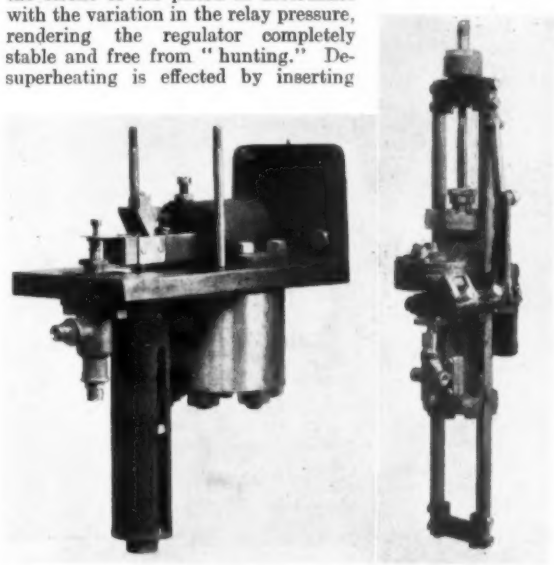
This valve has several advantages over the ordinary seat valve. The movement for a pressure variation is considerably greater, and there is no wire-drawing or chattering of the valve. Further, the design is much simpler and the power required for operating the butterfly is very moderate. Pressure reduction is effected by throttling during the passage of the steam through the butterfly, the position of which is governed by a pressure regulator connected by ¾-in. piping to the l.p. main. With a slight variation in the low pressure the regulator comes into operation and adjusts the position of the butterfly, thus re-establishing the required pressure.

The velocity of the steam in the valve is considerable, about 1,500 ft. per sec., and in the case of a recent London power station extension scheme it will reach the critical velocity, as the drop in the pressure is from 425 to 200 lb. per sq. in., and in this case it is constant and independent of the quantity of steam which passes through the valve. The venturi throat is calculated for the pressure drop required and the maximum quantity of steam which it has to pass, the butterfly being fully open on maximum flow, the complete movement between fully open and shut being used for control purposes. It is not claimed that the butterfly will shut off completely tight, but the amount of steam passed when the valve is closed is only about 1 per cent. of the maximum flow; or probably less than that which passes through an ordinary reducing valve after some service.

The Pressure Regulator

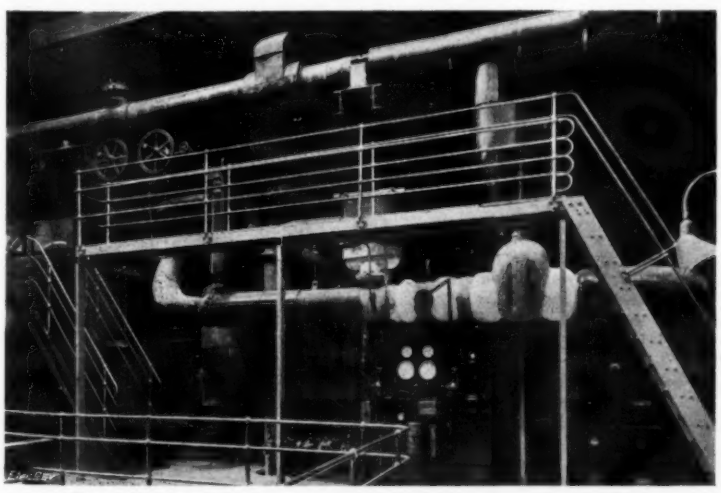
The feature of the pressure regulator is the simplicity of the moving parts. Pressure connection is made to the bottom of metal bellows, and a few ounces pressure variation is sufficient for a response. The contraction or expansion of the bellows causes movement of a weight-beam which, in turn, operates a small control valve, thereby adjusting the pressure in the relay sending line to the receiving regulator (power cylinder). The relay pressure is transmitted to a diaphragm, and the variation in the relay pressure operates through the movement of this diaphragm a small pilot valve which admits compressed air to either side of the power piston, opening up the other side to atmosphere.

Embodied also in the regulator is a compensator which limits the stroke of the piston in accordance with the variation in the relay pressure, rendering the regulator completely stable and free from "hunting." De-superheating is effected by inserting water into the valve at two points where the steam velocity is at its maximum. In this way the use of special spray nozzles is avoided. Water is pumped in at a pressure slightly higher than that of the h.p. steam, and the size of the opening depends on the maximum quantity which it is necessary to pass. The quantity of water is controlled by a dual-adjustment valve. A larger adjustment is made by the regulator which operates the butterfly, so that the water variation is in proportion to the steam variation. This method of control, however, does not take into consideration variations in the initial steam pressure and temperature, and a secondary control is given by a thermostat with a bi-metallic stem. The thermostat head is exactly the same as that of the pressure regulator. With a slight variation in the temperature the thermostat in the steam main, some 20 to 25 ft. from the control valve, adjusts the relay air pressure to a second receiving regulator connected mechanically to the secondary lever of the water-controlled valve. If the temperature in the l.p. steam main rises slightly the thermostat adjusts the relay air pressure, the receiving regulator takes up the new position, and the water supply to the venturi is slightly increased.



The master sender, and the receiving regulator and power cylinder

For de-superheating only a spray nozzle is used, the opening of which is adjusted by a receiving regulator under the control of a thermostat. This is necessary because the steam velocity at the point of insertion is normally only 5,000 ft. per minute. For pressure reduction only a venturi butterfly valve is used, and the operation is similar to that in the combined system. The moving parts of the regulators are totally enclosed.



A "Hagan" installation for dual service in a London power station

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Recording Uncontrolled Surges

THE construction of a high-speed cathode-ray oscillograph, which was built by the authors for recording the "uncontrolled" surges of a million-volt impulse generator, is described in the paper which Messrs. F. P. Burch and R. V. Whelpton are reading this (Friday) evening before the Meter and Instrument Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London.

The instrument is vertical with a discharge tube (source of cathode rays) at the top, the rays passing through a 1-mm. hole in the aluminium anode block into the main tube as a slightly divergent beam. The main tube is of drawn brass, 17.8 cm. bore and 145 cm. long, supported in an angle-iron frame. Surrounding it about half-way down is the magnetic focusing coil, through which direct current is passed and adjusted so that the magnetic field causes the diverging beam of electrons to converge and come to a sharp point focus on the phosphorescent screen or photographic film. The focusing coil is shrouded with iron to confine its field. Inside the tube at the same height are diaphragms of aluminium backed with lead, so arranged as to limit the beam while allowing a free passage of air.

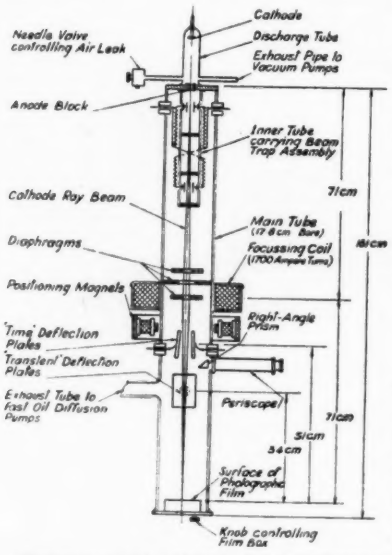


Diagram of the cathode-ray oscillograph

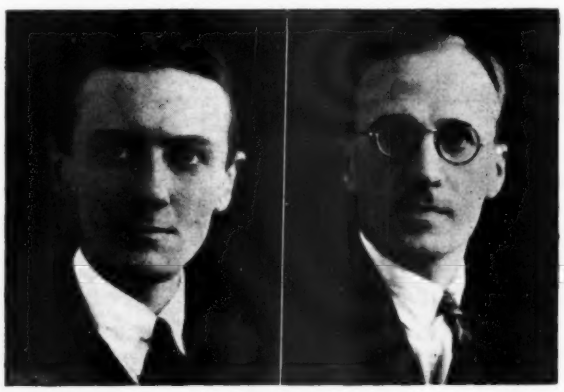
Deflection and Recording

Immediately below the focusing coil is a 4-pole electromagnet system by means of which the beam can be given independent steady deflections in two directions at right angles, and thus its zero position brought to any desired point on the photographic film. Inside the tube, below the position magnets, are the electrostatic deflection plates. These are carried on a removable framework, and are inclined for maximum voltage sensitivity. The upper pair is used for the time and the lower for the transient deflection. Contact is made to them by flat springs, from which leads are brought out through vacuum-tight insulating bushes.

The photographic records are obtained by allowing the cathode-ray beam to fall on a film inside the vacuum; the film box is mounted on the lower cover-plate of the tube and accommodates standard 6 by 9 cm. film on which twelve exposures of 6 x 6 cm. are obtained. The film is normally covered by a lid coated on its upper surface with phosphorescent zinc sulphide. To open the lid, a shaft passing through a vacuum-tight cone joint is turned; turning in the opposite direction closes the lid and, if continued, winds on the film for the next exposure. The phosphorescent screen can be observed by means of a small telescope and right-angle prism.

High-speed Pumping

In the upper half of the main tube, supported from the top cover-plate, is the beam-trap system, which is described later. The main tube is exhausted through a very short, wide pipe by two cascaded Metropolitan-Vickers condensation pumps operating with "Apiezon" low-vapour pressure oil. The very great speed of the pumping system (20 litres per sec.) enables it to maintain a vacuum of the order of 10^{-7} mm. of mercury in the main tube, despite the continual leakage of gas from the discharge tube through the hole in the anode block.



[Jerome

Messrs. F. P. Burch and R. V. Whelpton, joint authors of the accompanying paper

In the discharge tube a comparatively high gas pressure, 1 or 2 by 10^{-2} mm. of mercury, is required for the production of the electron beam. Air is accordingly allowed to leak in continually through a needle valve and is removed by a separate oil condensation pump. In this way, by sweeping air through at a good rate, any bursts of gas that may be evolved from the walls of the discharge tube are quickly removed and thus momentary pressure rises are avoided. The backing vacuum for all condensation pumps is provided by two cascaded pumps of the rotary vane type.

A large part of the paper is devoted to problems associated with discharge tubes, beam traps and sweep circuits.

The Case for Electric Building Heating

IN his paper, "The Relative Fuel Economy of Electricity, Gas, Oil, and Solid Fuel as Heating Agents," read before the INSTITUTION OF ELECTRICAL ENGINEERS last evening, Mr. A. H. Barker, B.A., explains why electricity can be used competitively for the heating of buildings, in spite of the fact that the cost of the crude heat is several times greater than that of any other heating medium.

Experience shows that the total amount of electricity actually delivered into buildings in a year, expressed in B.th.u., has been less, and in some cases very much less, than that which would have been necessary with hot-water heating; yet the buildings have been satisfactorily warmed at all times of occupation. Based on fuel prices of 0.5d. per kWh for electricity for local heating, 0.3d. per kWh for storage heating, 6d. per therm for gas, 80s. per ton for oil, and 40s. per ton for solid fuel, the percentage costs of crude heat (taking electricity as 100) are: local electricity 100, storage electricity 60, gas 41, oil 15.4, and solid fuel 11.3. Allowing for costs of fuel and labour only, the proportionate costs of heat are: local electricity 100, storage electricity 63, gas 43, oil 19.2, and solid fuel 17.

Where Electricity Scores

The principal features which enable electricity, consumed in suitable equipment, to allow competition with other fuels are its 100 per cent. technical efficiency, its instantaneous control, and the very low time-lag and absorption. Owing mainly to these features, an amount of heat fully equivalent to the electrical energy used can be delivered at the exact time at which it is required, thereby avoiding the waste caused by the lack of accurate timing inevitable in all systems in which heat is generated in, and distributed from, a central boiler.

After allowances are made for wasted excessive heat, and for the cost of labour, in addition to the efficiencies already considered, the following heat percentages are given for the various fuels: local electricity 100, local gas 85, storage electricity 51, gas boiler 50, oil 33, and solid fuel 21. A sharp distinction is drawn between the relative costs in the respective cases of continuous and intermittent heating. Economy of electric heating is shown to its greatest advantage in the latter case.

Relative costs per useful therm delivered for continuous heating by the various fuels are given as: local electricity 14.7d., local gas 7.2d., storage electricity 17.2d., gas boiler 12.1d., oil 6.8d., and solid fuel 7.8d. The following percentage figures of gross total useful efficiencies, excluding labour, for extreme cases show the advantage which electricity scores for intermittent heating. For a building in use twelve hours every day and six hours for one day per week, the respective percentages are: local electriicty 100 and 100, local gas 90 and 90, storage electricity 45 and 40, gas boiler 44 and 39, oil 35 and 31, and solid fuel 24 and 17.8.

Tables and diagrams show the progressive loss of heat in the

various stages through which the heat passes, and explanations are given of the details of the calculations of the heat quantities really necessary for maintaining the required temperatures, as well as of the proportions inevitably dissipated in the process of delivering heat from a central point to the rooms of the building to be heated.

The ratio between these is termed "occupation efficiency." When all matters are taken into account, the percentage costs per therm are: local electricity 100, local gas 56, storage electricity 222, gas boiler 156, oil 103, and solid fuel 156. The relative amounts of heat required per annum from various fuels for the same duty and under the same conditions for continuous use and five 10-hour days per week, respectively, are: local electricity 2,520 and 1,000, local gas 2,800 and 1,140, storage electricity 6,300 and 3,580, gas boiler 7,050 and 4,310, oil 8,100 and 4,950, and solid fuel 11,050 and 7,500. Relative overall costs per 1,000 cu. ft. of standard building space with 2,000 B.th.u. per hour calculated heat loss for continuous and five 10-hour days per week heating are given as, respectively, local electricity 100 and 100, local gas 48 and 48, storage electricity 143 and 179, gas boiler 128 and 176, oil 63 and 87, and solid fuel 75 and 125. The author points out that the gas fire, the most common method of using gas for heating, is only applicable to what may be called the domestic type of installation, and is not comparable with the forms of central heating discussed.

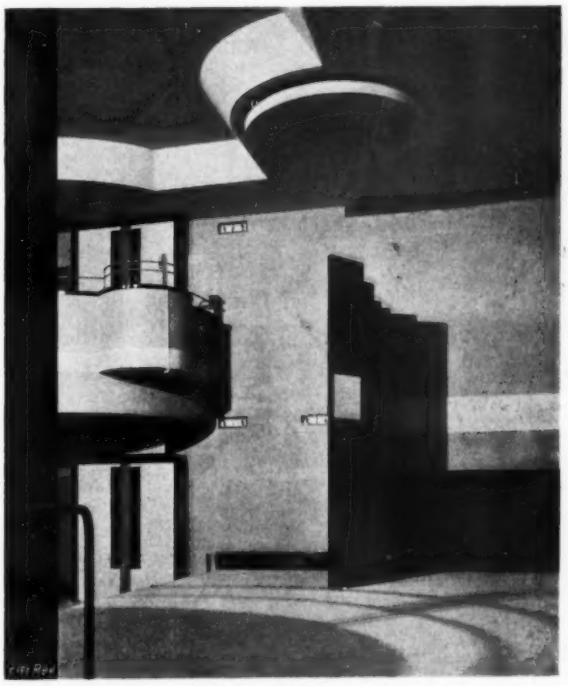
New Conceptions in Lighting

MR. W. J. JONES read before the ROYAL SOCIETY OF ARTS in London on November 30th a paper on recent developments in electric lighting. After some remarks about glare, reference is made to the relationship between visibility and illumination, it now being twenty-three years since Mr. J. S. Dow carried out his early experiments on this subject. Of cognate interest is the effect of vibration on the speed of seeing, such as is encountered in public conveyances, and another problem which is as yet unsolved is the assessment of that quality of lighting which facilitates stereoscopic vision of self-coloured objects. The gradation of brightness on the object permits the recognition of its shape, and especially aids the estimation of the magnitude of relief or recess.

Method of Design

Until recently illuminating engineers recognised these physiological aspects of lighting as dominant factors in preparing electric lighting schemes. Such considerations obviously still enter primarily into lighting designs for factories, where a close study of the nature of the visual task and a correct application of lighting will facilitate work. In the application of light to commercial and public buildings, however, additional factors are involved which frequently dominate all else. The development of built-in and applied luminous features which have popularly been called "architectural lighting" is the natural evolution from the point source system of lighting, and with it the electrical engineer has in some measure to revise many of his ideas.

One fact stands out clearly in connection with this movement, namely, that each step has led towards lower surface brightness of the light sources, so that to-day, in an architecturally lighted room, the illumination may be secured from glass panels lighted to 0.5 candles per sq. in., whereas a few years ago direct illumination from filaments of 5,000 candles per sq. in. would have been employed in the same interior. This enables the highest intensities to be attained without ocular discomfort. The architect of the future is going to place great reliance upon the interplay of the illuminated surfaces, as a means of securing architectural effect in interior decoration, and the engineer will be required to provide masses of lighted surface of a specified brightness. It is reasonable to suppose, however, that the architect will be concerned chiefly with the proportional brightness of one surface to another and not with the intrinsic brightness of any individual element.



A good example of architectural lighting—Broadcasting House, London

Electricity and Plant Growth

IN his inaugural address as chairman of the Irish Centre (Dublin) of the INSTITUTION OF ELECTRICAL ENGINEERS on November 17th Mr. F. R. Unwin referred to the applications of electricity to plant growth. He dealt at some length with the history of the research work already done in this direction, and suggested that plant culture intensified by soil heating and certain forms of lighting might become commercially profitable if electricity could be supplied cheaply enough.

Reference was made to the experimental work done at the Agricultural School at Wageningen, Holland, by Dr. J. W. M. Roodenburg, who had lent slides and tables illustrating forced cultivation by artificial light. With filament lamps suitable results might be obtained for raising seedlings up to a certain point, but the heat rays predominated to such an extent over the light rays that the plants "ran up" too quickly. It was necessary, therefore, to compromise between too much heat and too little light. With neon light there was no trouble from that cause, and the deep red light induced stronger formation of chlorophyll and the best development of foliage, while the assimilation of CO_2 was at its maximum. Such a low intensity as 75 W per square meter was sufficient, and the long tube of the neon lamp was particularly adaptable to greenhouse beds.

The mercury vapour light, on the other hand, did not give very good results, and in many cases proved harmful to the plants.

In a later part of his address Mr. Unwin said that supply in Ireland was gradually shaping itself, and there were now the following authorities in Northern Ireland: the Belfast and Londonderry Electricity Committees, the Electricity Board for Northern Ireland, and the County of Antrim Electricity Supply Co. In the south there was practically only the Electricity Supply Board of the Irish Free State. In Ireland the supply compared favourably in service and in price with anything that was available in similar areas in Great Britain.

How Loud Speakers Might be Improved

THERE was a very large attendance at the informal meeting of the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 21st, when Dr. N. W. McLachlan opened a discussion on loud speakers. Lantern slides and diagrams illustrated the design and performance of constituent parts, and Dr. McLachlan explained the action of the ordinary loud speaker over the natural range of sounds, and dealt at considerable length with the modes of vibration of cones. He said there was no mathematical formula for the vibrational frequencies of a cone, and they had to be found experimentally. The influence of coil mass and focusing of the radiation was treated.

A single loud speaker would only cover a range up to 4,000 or 5,000 cycles per second adequately. To extend the register an additional instrument was required. An extension of the range to 7,000 cycles per second made the reproduction much more natural and pleasing, and the masking effect of low tones was offset to a greater extent. Large low-frequency amplitudes caused alien tones owing to the inelastic centring devices and movement of the coil to the non-uniform field outside the air gap. Improvement in efficiency and greater damping of resonances would accrue with stronger magnetic fields and improved magnet design, preferably electromagnets. To obtain high efficiency a horn could be used with good results with a 6-in. diaphragm. In commercial receivers the speaker was a vital component and should be allotted a greater share

of the cost than was usually found to be the case now.

Mr. L. D. MacGregor showed a slide illustrating a device of "Bakelite" construction that had been tried with success in the French marine service. In this the stiffness of the centring device was altered, thus making it possible to shift the resonant points. Dr. L. E. C. Hughes said that in loud-speaker design one should have in mind that the original source of sounds had a size. This implied that an orchestra required a reproducer of very large area. He suggested an arrangement of loud speakers to obviate this disability.

Mr. L. H. Paddle exhibited a number of slides showing the influence of current on flux distribution in weak permanent magnets. By shaping the pole pieces the influence of the current was reduced and a greater undistorted output could be obtained. Mr. F. D. Smith showed a slide illustrating a loud speaker housed in a large hole in the ground and a microphone taken to all points of the compass in a circle round it. This study of sound distribution suggested a new method of investigating the velocity of the diaphragm. Mr. G. A. V. Sowter said that the magnet criterion factor suggested by Dr. McLachlan should be used in preference to a mere statement of the flux density. The dimensions of the air gap were of importance, the size of coil, and therefore the output for a given current, being dependent thereon.

High-voltage d.c. Plant

MEMBERS of the BIRMINGHAM ELECTRIC CLUB listened on November 24th to an instructive paper on "Recent Developments in Electrical Plant," by Mr. J. E. Calverley, of the English Electric Co. The lecture was illustrated with lantern slides, and dealt mainly with developments at the Stafford works of the English Electric Co. and especially with those relating to direct current and the conversion of a.c. to d.c. Mr. Calverley said that there was a limited demand for d.c. machines to deliver 10,000 V and upwards, but considerable work had been done in the last few years to meet the requirements of wireless broadcasting stations, where the increasing powers could only be utilised with the aid of higher voltages and comparatively small currents. Motor-generator design for this purpose was of a special kind.

[J. Busby Preston
Mr. J. E. Calverley

Lantern slides illustrated new models of electrostatic precipitation plant for the cleaning of gases, dusts, and fogs. One showed the arrangement of plant to treat 8,000,000 cu. ft. of gas per day, the efficiency of cleaning being about 99.9 per cent. The slide showed the extreme simplicity of the new system, no highly skilled attendance being required.

Speaking of mercury-arc rectifiers, Mr. Calverley said that their high efficiency and simple arrangement, together with satisfactory development in the last few years, had resulted in an increased demand for this type of apparatus for the conversion of electrical energy in sub-stations and industrial plant. The mercury-arc rectifier was a "series" apparatus in which there was a relatively small voltage drop. Apart from the losses in the transformer and auxiliaries, the loss in the rectifier unit due to this arc drop, which was independent of voltage, varied but little with the rectifier current. The efficiency of a rectifier was thus sensibly constant over a wide range of load and was determined solely by the operating voltage.

It was natural that the similarity between the mercury-arc rectifier and the thermionic valve should lead to attempts to apply to the rectifier those principles of control which had made the valve so perfect a device for radio transmission. The success that had attended the research work in this direction opened out so many new fields that there was a prospect that the grid-controlled rectifier would in a few years revolutionise heavy-current electrical engineering.

Will Generating Voltages Rise?

SOME aspects of the design of steam turbo-alternators was the subject of a paper which Mr. A. D. Sloan read on November 22nd before the London Local Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION. The construction of stators was not dealt with, but from considerations of rotor design the author concluded that the 100,000-kW 3,000-r.p.m. machine was well within the range of practical possibility at the present day.

In the subsequent discussion Mr. L. Morton, chairman, asked what was likely to be the highest generating voltage adopted in the near future. He had heard of two machines generating at 33,000 V and understood that some others were on order. Mr. B. N. Murray said that there was a greater degree of co-operation between the users and the manufacturers in America than prevailed between the two parties in this country.

Mr. G. N. S. Sichel said that success in building large turbo-alternators was largely bound up in the work of the steel maker and the metallurgist and their ability to produce steels and metals having much better physical properties than those in use to-day. Increasing the turbulence of the air used for cooling must increase noise, whilst the windage losses must be considerably more. High generating voltages had the effect of producing a large amount of ozone, which was bad for the insulation.

Mr. W. J. Oswald, speaking as an operator, asked for more attention to be given to the design of the connections going away to the switchboard. Usually, these were the weakest links in the whole scheme. Another matter which required careful attention was the design and arrangement of the brushes on the slip-ring. With large alternators, should the brushes be half way round or should they go the whole way round the slip-ring?

Mr. Sloan, replying to the discussion, said that fabricated structures had a considerable advantage over castings. He believed that Messrs. Parsons had in hand six 33,000-V machines, while Brown Boveri were producing two machines for Belgium. From the point of view of the dielectric he thought it would be possible to go to 50,000 V, but that did not mean that it would be economical.

As to the oil cooling of stators, for which his own firm had a patent, in the case of large machines it would involve the use of a "Bakelite" tube 25 ft. long and 4 ft. in diameter, which did not seem very attractive. Moreover, there was the difficulty of keeping the stuffing boxes and glands at the ends oil-tight. The Hungarian Railways had recently put some machines on electric locomotives, taking single-phase from a single trolley wire, in which the stator was oil cooled by means of a "Bakelite" tube with flexible joints at the ends, whilst the rotors were water cooled. It was too early yet, however, to say whether this would be a success. The attempts made to increase turbulence did not increase the noise or the windage losses. The brushes on the slip-rings should be distributed fairly all round.

Intentional Shadows

In a lecture on November 21st at the LIGHTING SERVICE BUREAU, Mr. R. A. Duncan, A.R.I.B.A., dealing with "Architectural Lighting," reviewed the changes in European culture as reflected in its architecture, and showed a number of lantern slides ranging from the Acropolis at Athens to the Titania Palast, Berlin. Lighting, he said, was not a matter for the technical expert or the architect alone, but could only be achieved successfully by collaboration between the two. If the technical expert was given a free hand he had a tendency to over-illuminate in his desire for efficiency. In churches, for instance, there was a very definite lessening of the dramatic effect of lighting if the whole interior was illuminated to the same intensity. Shadow was all-important, as was evident in some of Gordon Craig's stage sets, in which some of the vertical shadows were awe-inspiring. Shadows, however, should always be really intentional and never accidental.

Mr. Duncan's statements on "intentional" shadows and "turning night into day" provoked a spirited response from the audience who plied him with questions.

Electricity in Mines

Mr. S. Burns, chairman of the North of England branch of the Association of Mining Electrical Engineers, speaking at last week's meeting at Newcastle of the North-Eastern Centre of the INSTITUTION OF ELECTRICAL ENGINEERS, said that the mining industry in the North would be in a much worse position to-day if it had not been for work done by the electrical engineers associated with the North-Eastern Centre. He was not foolish enough to think that the general adoption of electricity for mining purposes would overcome all difficulties, but the Northumberland and Durham coalfield had maintained its position principally by reason of the effective use that had been made of the 49 per cent. increase of electrical horse-power connected below ground since 1922.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

The Central Board's Tariff

In the interesting article on page 773 of the November 25th issue of the ELECTRICAL REVIEW, by Mr. H. M. Sayers, there appear to me to be two statements which call for question. In the sixth paragraph of the article Mr. Sayers says that "the demand on the Board of an undertaking which has had a maximum demand of 2,000 kW or less during 1932 will be charged at the initial rate of £3 10s. until the demand is 3,000 kW over 2,000 kW, *i.e.*, 5,000 kW."

From an examination of the Board's tariff this does not appear to be correct. My reading of the tariff is that actually the first 2,000 kW would be charged at £3 10s., the next 3,000 kW being at the rate of £3 5s. That this latter statement is correct appears to be agreed by Mr. Sayers because in the eighth paragraph, in the example for Undertaker "A," he has calculated the charge for an undertaker whose basic demand was 2,000 kW, and who in the first year under the Board reached 2,500 kW at £8,625. This is 2,000 kW at £3 10s. and 500 kW at £3 5s.

The other point which I wish to raise is in connection with power factor. Mr. Sayers says that "power factor is brought into the kW charge from a standard of 0.85 lagging, with an allowance of plus or minus 4s. 6d. per kW for each 0.1 by which the actual power factor is better or worse than that standard."

My reading of the power factor clause is that whilst there is to be an increase in the kW charge in the event of the power factor being worse than 0.85, there is no corresponding reduction in the event of the power factor being better than 0.85.

HARRY HAIGH,
Engineer and Manager,
U.D.C. Electricity Department.

Shipley, Yorks,
November 26th.

My attention has been drawn to an apparent inconsistency in the two statements of the application of the "standard increment" and the reduction in the kW charge in the case of an undertaking with a "basic demand" of 2,000 kW.

The criticism is just. The correct interpretation of the provisions is that given in the second column on page 773, *viz.*, the first step in the reduction from £3 10s. to £3 5s. per kW will apply to any demand in excess of the 2,000 kW basic demand; it will not be delayed until the demand is over 5,000 kW as stated in the first column. I offer apologies to any readers who may have been puzzled.

Another correction is that the power-factor allowance only applies to power factors below 0.85; a better power factor will not earn a reduction in the kW price, but a lower one will be charged for at the rate quoted. This last point is rather curious; perhaps the C.E.B. experts consider the idea of any undertaking having a power factor better than 0.85 as too improbable for contemplation.

HENRY M. SAYERS.

London, S.W.16, *November 28th.*

Indeed!

British hotels do *not* require a "special E.D.A. campaign to enlighten them," neither does the "publicity" matter put out by E.D.A. indicate that that body possesses either the knowledge or ability necessary for the imparting of enlightenment. A few more or less crude circular letters, and a particularly ill-informed and somewhat silly booklet backed with assertions which the makers would find some difficulty in substantiating can hardly go far as "enlightenment."

If you care to refer to the report of the meeting at which the "campaign" was inaugurated you will observe that the effort was launched simply and solely for the benefit of the electrical industry—hotels were simply the selected victims. Altruism is *not* the strong point of E.D.A. Conceived in greed, born of ignorance, reared on misstatements supplemented with (if the gospel according to a certain gentleman is to be followed) a particularly paltry kind of bullying (see your own columns) the "campaign" reflects no credit on a great industry. It also seeks to introduce into British business methods which British business can well do without.

As to the cheap and rather vulgar jibes at one of the best customers of electricity (see your own columns) apart from lowering the tone of a great industry they reflect no credit on the profession of journalism.

For your information copies of the meeting referred to (*sic*), together with other extracts from the electrical Press, are being circulated throughout the hotel trade.

R. W. L. HAMILTON.

Maidenhead, *November 26th.*

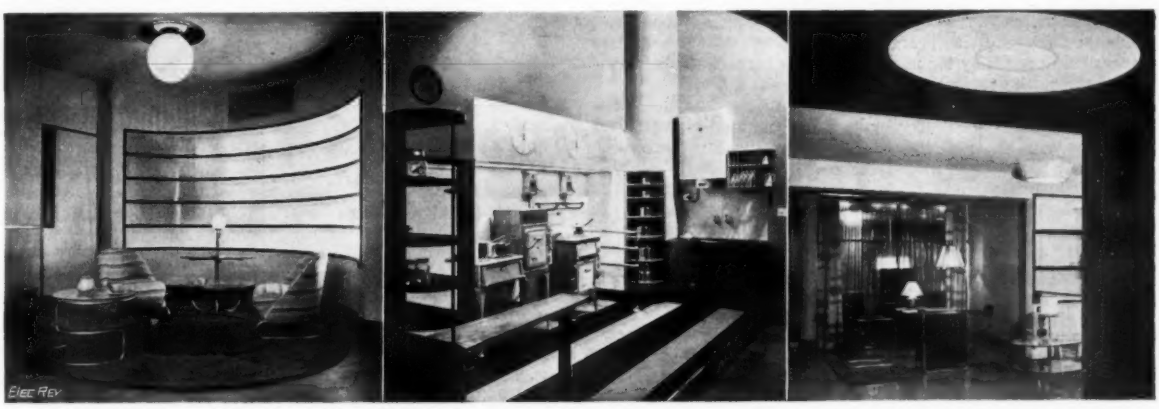
The South Shields Tramways

In the "Traction" column of this week's REVIEW there is a reference to the prospective curtailment here. I should like to say that the report made to you is not quite correct, as the reductions which are being recommended to the Council by my Committee refer to a number of workmen's tramcars and omnibuses which are doing little work owing to the fact that there are over 15,000 persons drawing unemployment benefit, and in consequence of the general depression in this district there is little work in hand locally.

There is no intention of curtailing any of the tramcar or omnibus services, and the work of modernising the tramway system is not being interfered with.

J. AUSTIN BAKER,
General Manager and Engineer,
Corporation Tramways and Motors.

South Shields,
November 28th.



The new Kensington and Knightsbridge Electric Lighting Co.'s showrooms (see p. 824) owe much of their neatness and attractiveness to various methods of modern illumination. In the centre is shown one end of the demonstration hall, the other two illustrations being views of the entrance showroom

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Can Gas Be Done Without?

Perusing some of the various letters by electricity "fans" (is this a contraction of fanatic?) one would be inclined to believe that the writers were unconsciously voicing the old legal axiom which advises "No case, blackguard the other side."

Lasting progress in any industry is based on using the most suitable material for the special work it is called upon to do, and just as no one grade of material is suitable for all purposes, neither can electricity entirely supersede gas, at any rate at present. The writer, though an electrical engineer, is quite prepared to use gas where it is most suitable, and some of these "all-electric fans" if they had the knowledge or experience might well weigh up the position if no gas had ever been available or its production was suddenly discontinued.

The watchman's fire of the cable-laying gang is kept going with gas coke, the outer serving of the cable is coated with gas tar, the wood troughing, if used, is also treated with

gas tar, whilst the laboratory of the cable works uses bunsen gas burners for its chemical work; even the articles denouncing gas are very probably set up on a linotype machine using gas for the metal melting pot, and the arc lamp, now more or less obsolete for street lighting, but still very much in evidence in photo print and block work, depends for its carbons upon the gasworks.

There are also the thousand and one chemical substances used in various industries which have their origin in by-products of the gas industry and until provision has been made for these the all-electric fans would be better advised to assist in finding or evolving substitutes instead of writing gassy letters. I believe in fair play, and for the time being it is useless and childish to talk of doing away with gas and using electricity for everything as some of your correspondents imagine possible. UNBIASED.

November 22nd.

Upon Applying for a Post

Many applicants for appointments mar their chance of success by ignoring some of the simplest elements. Selling one's ability or service is positively akin to a traveller selling his wares, and to make his wares attractive he studies the "make up" of his line from "cover to core." To appreciate this fully let the applicant consider himself the employer for the moment, with the replies before him, very often unopened or to be opened by a deputy. He would find himself confronted by a stack sometimes running into hundreds.

What automatically happens is that the envelopes are inspected and a preliminary selection takes place, not from the contents of the envelopes but from the outside, *i.e.*, their external appearance, with the result that possibly dozens are never opened. The advantage of a good quality, attractive looking envelope, clearly, carefully and neatly addressed, becomes evident; a foolscap size prevents the appearance of the interior papers being spoilt by too much creasing. Actually, an envelope that reduces the creases to a single fold is the best.

Once having attracted attention to the application by its external appeal, the interior make up of the application comes into consideration, and this is, of course, the main essential. What is it that the employer wishes to know about the applicant? The answer is "everything possible," condensed into the simplest form. This may be achieved very simply by a short covering letter in the applicant's own handwriting referring to the advertisement and drawing attention to the enclosures, *viz.*: (a) A most carefully and accurately typed schedule in simple date form of the applicant's career from the present backwards, indicating under school career any degrees, &c., so expressed, *without elaboration*, that an almost "at-a-glance" effect is obtained; (b) a schedule, also typed, setting out copies of recent testimonials; and (c) a photograph.

(For the reproduction called for under items (a) and (b) there are firms who specialise in very high-class facsimile reproductions which form excellent media for having this work carried out at a comparatively low cost.)

The arrangement is of prime importance. Good quality paper, neatness, method of expression, lay-out, style, &c., these express the personality of the applicant, and together with a suitable career secure for him the greatest chance of his appeal receiving due consideration. The failure of many applicants to receive the opportunity of being "short-listed" and interviewed is due to their disregard of the simplest commonsense principles—their refusal to take the trouble to make their application *attractive* and *interesting*.

One could enlarge upon these points at length, but perhaps it can be simply expressed by the analogy of the successful traveller—he has to study his external appearance to assist him in obtaining his interview, be able to express pithily the merits of his wares and have the wares to justify their description.

November 25th. E. S. C.

The I.E.E. Regulations

In your issue of November 25th, "Curious" asks whether the I.E.E. Wiring Regulations are enforceable by a supply undertaking. I believe I saw a statement in the REVIEW some time ago that West Ham Corporation is the only undertaking that has statutory powers of this kind, other undertakings being empowered merely to require that the leakage current shall not exceed a certain figure and that the installation will be of such a standard that it will not interfere with the use of electricity by any other consumer. I should be very glad if some of your readers would let me know whether I am right.

Regarding the earthing of apparatus in the home, the dilemma appears to me to be whether we dislike a flash more than a shock. Apart from the bathroom and the kitchen, there is not so much chance of receiving a shock if the apparatus is not earthed as there is of being burned if the apparatus is earthed. I have used electricity in my house for many years for all purposes and have never experienced either; neither have any of my friends, but such cases do occur and receive undue publicity. Therefore, it is very important that this point should be settled.

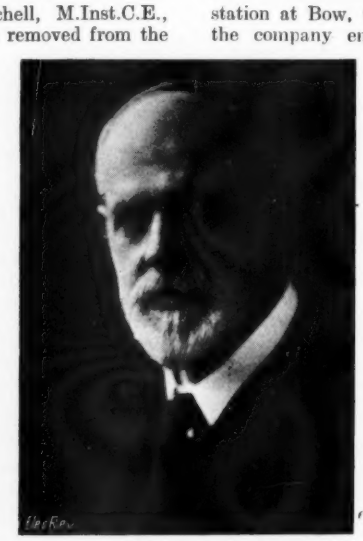
Another matter that should receive the immediate attention of the electrical industry is the multiplicity of regulations imposed by supply authorities, whether legally or otherwise. These make it difficult both for the manufacturer and for the contractor with connections in several towns. I am informed that one municipality requires a switch for every bar of an electric fire; this is surely not sound, as it may leave the flex alive when the fire is switched off.

Could not the Electricity Commissioners do something towards introducing uniformity in the regulations of supply undertakings and towards making them legally enforceable?

November 30th. REGULATOR.

The Late Mr. W. H. Patchell

THE death of William Henry Patchell, M.Inst.C.E., Past Pres., I.Mech.E., M.I.E.E., has removed from the electrical profession one who for many years occupied a foremost position in the electricity supply world, and subsequently was prominent among consulting engineers. He passed away on November 24th, at his residence at Beckenham, at the age of seventy years. The funeral service took place on Tuesday at the Parish Church there, followed by interment at Elmers End Cemetery.



[Underwood & Underwood, N.Y.

The late Mr. W. H. Patchell

Mr. Patchell was educated at Louth, and an apprenticeship with Robey & Co., of Lincoln, followed. He represented that company at the Paris Electrical Exhibition of 1881, and five years later left them to join the old Electrical Power Storage Co., pioneers in secondary battery manufacture, of whose works at Millwall he became manager. This position he relinquished early in 1893 to become engineer-in-chief to the Charing Cross and Strand Electricity Supply Company. For thirteen years he continued in what was at that time one of the principal positions in metropolitan electricity supply, and was responsible for the design and construction of the Charing Cross Company's extension works, including the Lambeth generating station and the power station at Bow, which followed the widened activities which the company embarked upon under the City of London Order of 1899.

Since he vacated the Charing Cross appointment in the year 1906, he had been engaged in private practice at Westminster (at 64, Victoria Street), as a consulting mechanical and electrical engineer. He was responsible in this capacity for much power station and distribution work, and specialised in electrical mining and heavy industrial installations. He was responsible for the equipment of the Ferndale and other collieries.

Mr. Patchell was closely interested in the Institution of Electrical Engineers (of which he became an associate in 1888 and a full member in 1891), and twice filled the office of Vice-president (1904-7 and 1909-12). He was President of the Institution of Mechanical Engineers in 1924-5. He was also a fellow of the American I.E.E. and a number of important books and institution papers on subjects indicated in the above notes came from his pen. His many appointments included membership of the Home Office Departmental Committee on Electricity in Mines (1904). He chose the development of prime movers for driving electric generators as the subject of his inaugural address.

New Apparatus and Devices

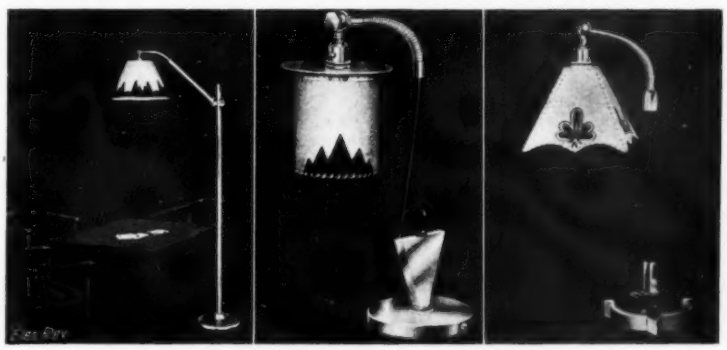
for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

"Typerlite" Fittings

Several new lighting standards have recently been produced by the TYPERLITE COMPANY, 86, Cannon Street, E.C.4.

The "Auction," an all-metal floor standard priced at from £4, has a heavily weighted circular base to stand at the corner of a card table well out of the way of the players. It is fitted with an adjustable extension arm of any desired length and a metal flexible top with a knuckle joint and a push-bar holder. The light can be centred at any desired height over the middle of the table.

The "Burlington" is a metal desk standard with an adjustable upright which can be fixed at any desired angle. It has a flexible top, knuckle joint and a polished chromium plated circular top reflector with a cylindrical black and white translucent shade. The price is £3 17s. 6d. with shade. A somewhat similar model, the "Grosvenor," has a non-adjustable stand and is sold at £3 12s. 6d. ready wired, with shade and fitted with a ball joint, enabling the light to be projected in almost any direction.



The "Auction," "Burlington," and "Grosvenor" fittings

A Photographer's Lamp

A new product of the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, is the "Osram" photographic reflector for providing an intense light for indoor photography. It is constructed of aluminium, having a highly diffusing sand-blasted surface inside, and is finished in crystalline black enamel on the outside.

A photographic reflector

The reflector is mounted on a short stand enclosed in a heat insulating handle, a circular base being screwed to the lower end of the pillar. A knuckle joint and a wing nut allow tilting to any angle, and a focusing device is fitted. The price is £1 15s.

Marconi Short-wave Equipment for Aircraft

The latest type of Marconi short-wave aircraft apparatus comprises a type A.D.25A telegraph-telephone transmitter and type A.D.23A receiver. In the transmitter a single valve of the pentode type is used both for the generation of low power oscillations at a constant frequency and for their subsequent amplification. By this means a single valve does the work for which two valves are normally employed, with the result that very great saving in space and weight is secured.

The aerial system employed is permanently attached to, and insulated from the wings and fuselage of the aircraft. On the other hand, in cases where the use of a short trailing aerial is practicable, it may be employed with a corresponding increase in the range of the set. The transmitter and receiver are arranged as separate units. Alternatively, the two instruments can be supplied mounted in one case. Either the transmitter or the receiver can be separately installed if two-way communication is not required.

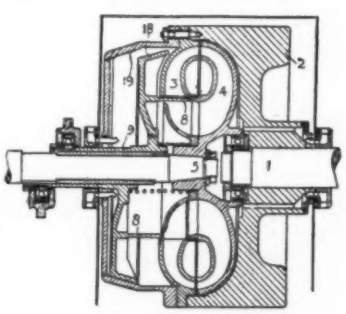
The transmitter is capable of either telephony or c.w. and interrupted c.w. telegraph signalling, on any wavelength between 90 and 130 metres. In addition to the pentode valve, only one other valve is employed, this is a valve of the broadcast receiver "power" class, used as the modulator for telephone transmission. Two tuning controls are provided, a calibrated drive circuit control and an output circuit control. The other controls are the send/receive switch which can be operated directly by hand or by remote control, and the switch for changing the type of transmission.

The receiver is constructed on a metal chassis and fitted into a metal case. Two screen-grid high-frequency amplifier stages are employed followed by a detector and one stage of low-frequency amplification. The high tension supply for the transmitter is provided by means of a rotary transformer driven from the plane's 12-V lighting supply through a starting relay actuated from the send/receive switch in the transmitter. High tension supply for the receiver is taken from a 120-V dry battery, and low tension for the valve filaments from a separate 4-V accumulator. A wind-driven charging generator, 12-V accumulator, and other necessary power accessories can be supplied with the apparatus.

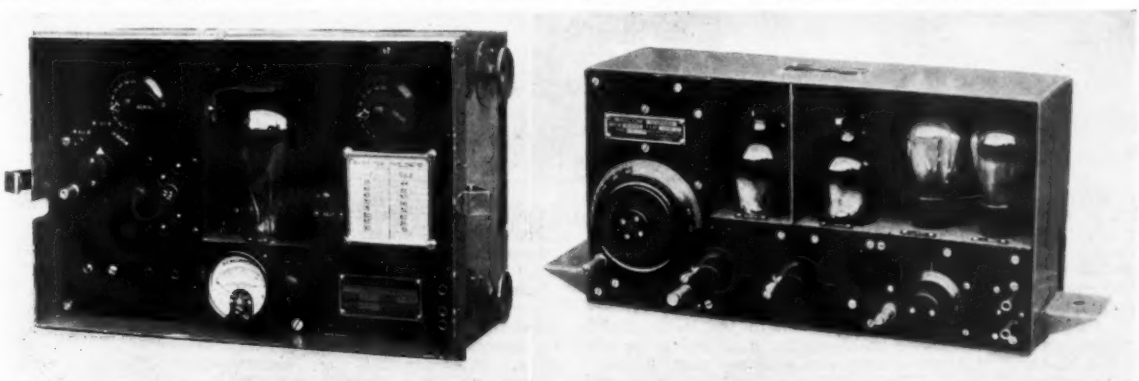
Hydraulic Variable-speed Couplings

In connection with the Vulcan-Sinclair hydraulic variable speed coupling described in our issue of November 11th last, it is interesting to learn that a British patent (No. 381094) has recently been granted to Dr. Walther Voith and others, trading as the J. M. VOITH CO., the well-known turbine manufacturers of Heidenheim, Germany, for a new fluid clutch or variable speed coupling.

The principle of the well-known Fottinger fluid clutch is employed, to which is added a locking ring to arrest the circulation of the fluid, also a friction clutch to ensure a positive drive. The flywheel (2) is secured to the engine shaft (1) and carries with it the driving member (3), to which is attached a casing (19). The driven shaft (5) carries with it the driven hydraulic member (4), the locking ring (8), and the male portion of the friction clutch (18), 8 and 18 being capable of sliding on the driven shaft (5). In the accompanying drawing the upper part is shown in the disengaged position, whilst in the lower part the device is depicted in the engaged position.



The "Voith" coupling



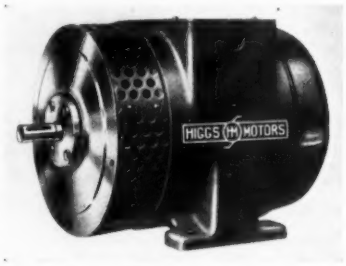
The "Marconi" A.D.25A aircraft transmitter and A.D.23A receiver

When it is desired to allow the clutch to run with the greatest amount of freedom, the locking ring (8) is brought into such a position that it interrupts the flow of liquid from one member to the other, and at the same time the friction clutch is free. When, however, the locking ring is moved to the left and the flow of liquid permitted, the drive is gradually taken up, and, by moving the sleeve (9) farther to the left, a positive drive can be maintained.

Flange-mounting Motors

There is a marked tendency at the present time to employ individual electric drive for small machines. In order to save weight and space manufacturers are incorporating a suitable electric motor in many types of machines. In other applications such as small pumps, compressors, fans, gear units, &c., it has been found convenient to mount the unit direct on to the motor frame itself.

A line of flange-mounting motors covering the usual range of electricity supplies has been introduced by HIGGS MOTORS, Witton, Birmingham.



A " Higgs " flange-mounting motor

These are standard industrial motors fitted with end covers of machined face type, which are designed to carry the whole weight of a motor that can be fixed at any angle. The facing is machined flat and can be supplied with a spigot of various diameters and depths to suit customers' requirements. Any reasonable number of fixing holes, plain or tapped standard threads are included. Where the motor is required to be fixed in any position other than horizontal, or to cope with an end thrust applied externally, a ball thrust race is fitted.

The motors can be supplied with or without feet on the carcase and the standard shaft extension can be modified. As standard industrial motor parts are used, the extra cost of this flange mounting is very small and as will be seen from the illustration a very neat and compact unit is the result.

Small Electric Furnaces

WILD-BARFIELD ELECTRIC FURNACES, LTD., Elecfurn Works, North Road, Holloway, N.7, have introduced a self-contained general purpose electric furnace in a range of sizes for (a) the heat treatment of small or specialised parts in works; (b) laboratories; and (c) technical colleges. The heating chambers are of moulded refractory. The resistances are of " Pyromic " inductor-melted 80/20 nickel-chromium wire or rod (manufactured by the Telegraph Construction & Maintenance Co.), for which the company has sole distribution rights. The windings are protected from overheating by an excess temperature cut-out consisting of a loop of silver wire which fuses at 960 deg. C. or a gold wire which fuses at 1,050 deg. C. This furnace

Left: A self-contained general purpose furnace. Right: A small experimental melting furnace

is suitable for hardening, annealing, reheating, and tempering, in addition to general heat treatments with either a.c or d.c. With a.c. only it can be used for case-hardening.

Any of these furnaces can be fitted with a magnetic detector for automatically indicating the exact quenching point of carbon, case-hardened and low-alloy steel parts. The prices (with hand temperature control) range from £46 for a 3.8-kW model measuring 17 by 11 by 4 in. to £98 for a 15-kW furnace with dimensions 31 by 20 by 10 in., suitable for 200 to 250 V, other voltages costing about 25 per cent. more.

Another new product of the company is a small experimental furnace in two classes working at temperatures up to 400 deg. C. and 800 deg. C. for melting metals in an atmosphere free from fumes with accurate temperature regulation and using graphite crucibles. The heating chamber and elements are similar in construction to those of the general purpose furnace. The chamber is enclosed in a sheet-metal case with an " Elecfurnite " top plate and a soft grey c.i. bottom plate. Refractory plug or cog-operated doors are supplied. The prices, complete with hand-temperature controller, and dial thermometer or pyrometer indicator, are for the smallest of the three sizes (5 in. dia. by 10 in. deep) £13 2s. 6d. for the lower temperature (650 W), and £15 10s. for the higher (1300 W), and for the largest (12 by 23 in.) £37 10s. (4200 W), and £42 (8400 W) respectively.

These furnaces can be fitted with automatic temperature control, which is effected by depositor contacts which are made or broken according to the temperature of the furnace. Relays, operated by the contacts, break the main current or, in the larger sizes, open the contactor switch. No indicating pyrometer is necessary, but a recording pyrometer may be advantageous in experimental work. A 15-day time switch can be incorporated to switch the furnace on some time before it is used or to switch off at any predetermined time.

The control panel is finished in polished ebony and carries pilot lamps, temperature regulator, and depression mechanism, relay and time switch. All connections are immediately accessible when the panel is opened.

A Useful Reading Lamp

The " As-you-like-it " lamp has a " Bakelite " lampholder fitted to one end of a soft leather strap (available in various shades of brown, blue and green), while at the other end a

An " As-you-like-it " lamp

weight is fitted inside the strap, so that when it is hung over a chair back or bed-head the weight balances the lamp.

It can be hung on the wall, at the side of a writing table, over a dressing table mirror, or on a chair-arm. With upright pianos the weight can be placed inside so that the light shines on the music. The lamp can also be hung on the wall with the shade underneath, and is decorative, useful and economical.

It is obtainable with a " grained parchment " plain hand-tinted orange shade for 15s. 6d., and with art parchment hand-painted shade or a silk shade for 17s. from MESSRS. FRASER & HOWARD, LTD., 22, Ely Place, Holborn, E.C.1.

The " Ace " Inspection Lamp

The " Ace " hand inspection lamp is watertight, vapour-proof, and shock-proof. These qualifications are brought about by several interesting methods. The handle is made of tough black rubber, and the cable entry is at the top end where a patent cord grip prevents the entry of moisture to the inside of the handle. The glass cover protecting the lamp bulb fits into a rubber well and is practically watertight without its clamping collar.

The " Ace " handlamp

The lamp can be dropped on to the ground without damage. A hook is provided in the guard for suspension and one half of the glass is frosted so that when the lamp is held in front of the eyes a direct light is applied to the work without dazzle. Vacuum lamps up to 60 W are recommended. The lamp (price 21s.) is made by the WENHAM LIGHTING CORPORATION, LTD., 184, Gray's Inn Road, W.C.1.

Electricity Budget Control. By A. W. Willsmore, F.R.Econ.S.

Suggested applications of a system used in manufacturing industries

THE essential object of budget control is to provide for the formulation of plans that will enable business to be controlled towards a maximum profit figure with a minimum of expense. These plans are based on a reasoned anticipation of the future and are designed to ensure a complete co-ordination of all activities towards a common goal. The purpose of this article is to outline the practical application of budget control principles to the electricity supply industry.

In the United States, most electric light and power companies are called upon to compile a budget outlining the expenditure which will be required for the coming year. Similarly, certain Dominion supply companies are obliged to submit a forecast of the following year's revenue and expenses with the usual annual returns. Many undertakings in this country, also, in the natural course of their operations, make forecasts of possible chances of growth of supply business of various kinds.

It is chiefly for the benefit of the many others which either leave things to take their own course or which make only a very casual glance into the future that these notes are prepared.

As applied to the electricity supply industry, budget control involves two distinct but associated aspects. In the first place, an engineering programme must be developed to provide for physical extensions necessary to cope with anticipated additions to the system. In the second place, a financial programme must be worked out to cover the arrangements for financing the business as a whole, including the contemplated capital extensions. The combined programmes must also be interpreted in terms of an estimated profit and loss statement for the year, with a view to providing proof of the economic advisability of the contemplated plan of operations; consideration of the combined programme may point to the desirability of some modification in the original estimates.

The subject of electricity supply forecasts may at first arouse little enthusiasm in the minds of those in charge of undertakings with an obscure future under the grid, but as a matter of fact it really assumes greater importance because in many places generation will become a secondary matter and distribution on commercial lines will be the chief reason for existence.

Foreseeing Possible Changes

A review of distribution prospects in terms of new consumers to be connected during the year and an estimate of the amount of energy to be sold, is the initial step. Studies of past records would be made to indicate the average number of new consumers added each year. Care would be taken, however, not to use this figure as representative of new consumers to be connected during the budget period without making adjustment for any factors likely to disturb the normal growth. Attention must always be paid to any impending

The new Ediswan showrooms and offices, 23, Constitution Hill, Birmingham

large scale housing developments that may entirely change the outlook in certain districts. Similarly, any known proposals for opening up new factories, and for the erection of cinemas and hotels must be taken into account, together with the anticipated results from any contemplated extensions of the system in rural or other areas.

The estimate of the amount of energy which will be sold during the budget year must be prepared with particular reference to the incidence of the demand in terms of seasonality, diversity and peak figures, and the tariffs under which the supply will be taken. Here, again, a study of past records will provide basic figures which must be adjusted to take account of the increases in the number of consumers, anticipated general trade conditions in the area, and any plans aimed at increasing the domestic use of electricity or developing off-peak demand. This estimate must be prepared in such a form that it can serve as the basis for calculations of revenue from sales, units to be produced and peak demands at significant periods. The figures must also be coupled with a physical extensions programme either in terms of individual projects or in basic overall units.

Having completed a survey of the distribution field, it is next necessary to decide what, if any, new generating plant will be needed to cope with the anticipated demand. In this connection, consideration must also be given to the desirability of the replacement of obsolete plant with new equipment or any similar changes, so that an overall programme may be developed.

The final steps in the budget programme are to investigate the possibility of financing the contemplated extensions and to consider the profit possibilities of the undertaking for the period under review. Considering first of all the profit and loss aspect as normally figured in the company's books of account, an estimate must be made of the probable revenue. The estimate of sales of energy should be prepared with the necessity for this calculation in mind so that adjustment can be made for any contemplated modifications to tariffs or for any business taken under special terms. Anticipated revenue from other sources would be added to this figure so that costs and running expenses can be set off against the total, to show the anticipated profit or loss on the year's working.

Possible Modifications

In the light of the balance between anticipated revenue and expenses it may be found desirable to modify the contemplated programme for the budget period. If prepared in the right way the figures should prove of considerable assistance in guiding decisions to revise tariffs and in indicating at what minimum figures additional " off-peak " business would be profitable. It will be appreciated that if any modifications are decided upon at this stage, the necessary adjustments must be made to the programmes outlined above before proceeding with the next step in the budget. This involves a consideration of the cash position for the budget period.

In the cash budget all of the various items in the subsidiary budgets already mentioned are considered in relation to the movement of cash. From the profit and loss statement a monthly figure of probable cash receipts must be calculated on the basis of invoicing and collection periods. A similar monthly estimate must be made for cash outgo for rent, rates, taxes, interest, wages, salaries, fuel and supplies. A comparison between these two sets of figures will yield net monthly increases or decreases to the cash balance and attention can then be paid to the cash reflection of capital expenditure items. Towards this end a decision must be reached as to when cash outlay will be required for new distribution mains or generating and transforming plant, &c., so that this figure can be offset against the available cash balance determined above. After making allowance for the fact that a certain minimum cash balance must always be kept on hand to provide for emergencies and to allow for possible inaccuracies in the estimates, it should be possible to prepare a programme for financing the business during the year.

A " Quota " System

As a final step in the budget programme, it should be possible to prepare from the data already collected a forecast balance sheet showing the position of the undertaking at the close of the budget year. It will be apparent that apart from any other advantage, the actual preparation of a budget forecast has great potential value in forcing the management to think ahead and to consider its plans for the future in terms of the probable trend of events. The maximum utility of budget control cannot, however, be realised unless efficient plans are made for the administration of the budget. Towards this end the distribution area may be divided into sub areas, and quotas established from the budget figures may be set up to represent anticipated new consumers to be added, units to be sold and distribution expenses. Similarly, expense quotas may be set up for the generating side of the business so that actual results in both the generating and distribution field may be continually compared with the budgeted programme.

Recent Events in Canada.

FROM OUR OWN CORRESPONDENT

IN July and August this year there occurred no fewer than four outstanding events in the history of Canada, three of them at least being of major importance.

On July 18th representatives of the Governments of the United States and Canada respectively, signed an international treaty, the terms of which cover the proposed development of the St. Lawrence River, for both power and navigation purposes, in the international section which has the province of Ontario on the north bank and the State of New York on the south. On July 21st the Imperial Economic Conference was opened in Ottawa. On August 6th the Welland Canal, which will form an essential link in the waterway from the Great Lakes to the sea, if and when the St. Lawrence River is opened up for ocean-going ships, was officially opened by Lord Bessborough, Governor-General of Canada, and on August 10th the new laboratories in Ottawa of the National Research Council of Canada were also opened by His Excellency.

The Treaty regarding the St. Lawrence has to be ratified in Washington by Congress and in Ottawa by the Canadian Parliament in order to make it effective. The fact that a change of Government has just taken place in the United States may cause delay in ratification, but perhaps more delay will occur in connection with the raising of sufficiently large sums of money for the work.

The Imperial Economic Conference

As to the Ottawa Conference, while it will no doubt result in decided benefit to some lines of industry, the outlook for the British electrical manufacturer does not seem to be improved, except in a few cases. Telephone and telegraph apparatus and radio apparatus and flame-proof electric switchgear seem to be the only items in which any advantage will be given to the manufacturers at home.

The last-named item seems to be confined to mining gear. If so, this will be unfortunate, because a new situation will shortly arise in the United States which may extend to Canada. It is believed that the "National Electrical Code" of the United States in its next edition will require that flame-proof equipment shall be used in garages and other premises where hazardous (fire) conditions exist—this will extend the market for such equipment to other fields. If this requirement should be adopted in the Canadian Electrical Code it would add appreciably to Canada's demand for such equipment, although the sizes of the apparatus and devices required might be smaller than those needed in mines.

It must be confessed that the gain in possible exports of Canadian electrical equipment to the United Kingdom seems to be considerably greater than that of possible exports of British electrical equipment to Canada. Four items, formerly taxed in Canada and now put on the free list, seem to compare rather unfavourably with the twelve items to which the same treatment has been accorded in Great Britain to Canadian electrical products. It remains to be seen what the British manufacturer will now accomplish, and what inroads the Canadian electrical manufacturer will be able to make into the home market of the former.

The Electrical Code

Mention of the Canadian Electrical Code calls to mind the fact that the last province of the Dominion, Manitoba, has now adopted it. This Code is therefore a legal document throughout the entire country, and its requirements are enforceable by law in every province. These remarks apply to Part I of the Code which covers installation work in domestic, commercial, and industrial premises. Part II consists of specifications, one of which has been published; several are almost ready for publication, and others are in prospect. The specifications cover such materials and equipment, apparatus and devices as have received or are receiving the *cachet* of the Approval Laboratory of the Hydro-Electric Power Commission of Ottawa and of the Underwriters' Laboratories of Chicago. A publication called "Definitions and General Requirements Applicable to all Specifications" will shortly be issued as a nucleus of Part II, and the various specifications comprising this part will be published as they are ready.

Part III of this Code, which is in course of preparation, will deal with outside work, overhead and underground. Progress on this is slow, and it may be some time yet before it is ready. The subject is very complex, especially with regard to overhead work which involves consideration of high and low-pressure lines for both transmission and distribution, crossings of such lines with each other and over buildings, roads and railways, joint pole construction for power and telephone work, as well as problems relating to both inductive and conductive interference of power lines with telephones.

To return to the list of outstanding events—the construction of the Welland Canal was undertaken by Canada in the expectation that before many years are over there will be a clear passage for ocean-going ships from the Great Lakes to the sea. Until that passage is opened by the development of the St. Lawrence River the canal cannot fully justify its existence.

The National Research Council, through the work of its great new laboratories, can take a very useful part in the development of this country and its vast and varied natural resources. At the moment, however, lack of adequate funds will probably retard rapid extension of its activities.

Poor English Representation

The Canadian National Exhibition held at the end of August and the beginning of September in Toronto again failed to attract any exhibits of British electrical firms, except a few which have branch factories here. It seems unfortunate that no opportunity is afforded to the Canadian public to familiarise itself with British electrical products at this great annual exhibition which is attended by immense numbers of people from all over Canada as well as many from other countries. One would think that some co-operative effort could be made whereby a considerable variety of British products could be placed on view. Many British firms do exhibit their wares, but they are not electrical.

Could not the I.E.E., next year, follow the example of the Institution of Mechanical Engineers and arrange for a number of its members to come to Canada and see what is going on electrically? This suggestion was made some months ago but too late for any action this year, apparently. Individual members of the I.E.E. may know something about Canada, but one feels that, officially, that body is largely ignorant of conditions here, and a visit of a representative body of members, including the President and the Secretary, might be of advantage on both sides of the Atlantic.

The New "K. & K." Showrooms

AS the oldest public supply undertaking in the country the Kensington & Knightsbridge Electric Lighting Co., Ltd., is naturally well on the road to reaching saturation point with regard to lighting installations, and it is thus now able to concentrate upon other electrical applications. The introduction a short time ago of assisted and free wiring schemes for cooking and water heating installations, &c., has had very encouraging results, and has led to the opening of extensive new showrooms at 148, Brompton Road, S.W.3.

The design of the new premises is entirely different from anything we have seen before, and makes use of a number of exceedingly attractive modern architectural and lighting artifices. Generally the lighting arrangements employ the new ball-type fitting, but all methods are represented.

The entrance showroom is devoted to the exhibition of various small electrical appliances, the show window being fitted with removable screens, which, when taken down, make the whole showroom a display window. Various shades of green have been used in the colour-scheme of this room, at the end of which is a curved window-bay with horizontal glazing illuminated by neon tubing. Mirrors, glass and metal enhance the character of the exhibits, and tubular metal furniture is used. Glass shelves with hidden reflectors carry the smaller pieces of apparatus, while platforms have been provided for the larger items.

The general offices include a cashier's counter, showroom manager's office, and interviewing lounge. The last-mentioned is designed to show modern methods of lighting and heating in a domestic interior, and a Ferranti fire has been built into the wall. The principal feature of this room is an electrically heated niche filled with sub-tropical plants.

For demonstration purposes a large room has been provided. At one end of this is a platform on which are assembled for demonstration cookers, a refrigerator and a water heater, as well as other kitchen equipment. On the wall above are large dials indicating the current consumption of apparatus on circuit. In addition a large selection of cookers, water heaters, washing machines, towel rails, &c., is to be seen at the other end of the room, where a model bathroom also shows how an electric water heating system can be incorporated attractively in an existing installation. Mr. A. L. Trundle, the secretary of the company, tells us that invitations are being issued to small groups of "prospects" to attend special demonstrations.

Tubular heaters, thermostatically controlled, are used to warm the rooms, radiant panels having also been installed in the demonstration room as a supplementary or alternative system. The building is provided with synchronous clocks throughout. The electrical installation was carried out by Messrs. Troughton and Young, Ltd., to the design of the architect, Mr. R. McGrath. Pictures appear on page 819.

In the Courts

IN the Bow County Court, on November 25th, before Judge Dumas, there was an application for a review of an award under the Workmen's Compensation Act by the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., of Silvertown, London, the respondent being Frank E. Green, a rubber worker. The application was for the termination or diminution of the award of 26s. 5d. a week compensation made in favour of the respondent on April 6th. The respondent had worked for the applicants for five months, when he was certified as suffering from dermatitis, which it was suggested he contracted whilst using a liquid impregnated with caustic soda used in the process of stripping rubber. It was agreed that rubber gloves were supplied to him, but that he did not often use them.

Dr. Ross gave evidence for the applicants, and said that the man was physically all right and would continue to be so as long as he kept away from irritants. For the respondent, Dr. Henry C. Semon said he examined the man on November 3rd, when he certainly had a chronic ulcer which he would have called indolent, as it had been there since April. If it had healed since then it did not alter his diagnosis. The man would positively recover so long as he did not get near an irritant or caustic soda. Anyway, six months from the present time should be allowed.

Judge Dumas said that he must find in favour of the applicants as he felt that there was a wide field of labour open to the respondent. He would, however, make a declaration of liability, but would make no order as to costs.

A Compensation Award

Sheriff Robertson delivered judgment in the Glasgow Sheriff Court on November 23rd in an action brought under the Workmen's Compensation Act, by George Brown, an electrician, against Napier Bros., Ltd., engineers, Glasgow, claiming compensation at the rate of 30s. per week. The claimant stated that in January, 1925, while employed with the respondents, he was engaged switching on the electric current to some radiators, when, owing to a short circuit, his left hand was burned and his right arm was severely electrically shocked. He returned to his employment the next day, but his hand remained bandaged for several weeks. In October, 1931, he was informed by his medical adviser that he would never recover from the accident, and he gave formal notice to his employers. He continued at work until August 25th, 1932, when he was no longer able to carry on. In the last year of his employment he was only able to do supervising work. Prior to the accident his average wage was about £4 per week.

The respondents submitted that the claimant's present condition did not arise from the accident, and further submitted that the claim could not be upheld as it was not intimated within six months of the date of the accident.

Sheriff Robertson, assisted by a medical assessor, decided that the claimant had been totally incapacitated since August 25th, 1932, as a result of the accident, that he suffered from progressive muscular atrophy, and that he had proved reasonable excuse for not intimating the claim within six months. He therefore awarded the compensation claimed and held the respondents liable in expenses.

A Breach of Electricity Regulations

In the Paisley Sheriff Court on November 22nd, Sheriff Hamilton convicted Saunders and Connor (Barrhead), Ltd., of having, on July 29th, in their Darnley Works, Barrhead, neglected to observe the regulation under the Factory and Workshops Act, 1901, and 1907, requiring that conductors, viz., cables carrying electrical current for an overhead crane situated in the bath moulding shop of the works, should be so worked as to prevent danger so far as was reasonably practicable.

It was stated that a steel erector was engaged in the bath moulding shop preparing to erect staging for the purpose of repairing the roof. He came into contact with the conductors and was killed. A fine of £10 was imposed, together with expenses amounting to £2 9s. 8d.

Second-hand Lamps

In the Chancery Division on November 25th Mr. Justice Eve had before him a motion by the British Thomson-Houston Co., Ltd., for an interim injunction to restrain T. Francis & Sons from selling as and for the plaintiffs' lamps, second-hand or used lamps. Mr. K. S. Shelley, for the plaintiffs, said that the defendants were prepared to treat the motion as the trial of the action, to submit to a perpetual injunction, to pay the taxed costs of the action, submit to an order for an inquiry as to damages, and deliver up all infringing materials, especially cartons which had been employed and by which the "passing off" took place.

Mr. Justice Eve made an order accordingly.

A similar motion came before his Lordship in an action brought by the General Electric Co., Ltd., against the same defendants, and an order was made in the same terms.

Alleged Trade-mark Infringement

Mr. Justice Eve in the Chancery Division on November 25th heard a motion by the General Electric Co., Ltd., against Goodman's (Leeds), Ltd.

Mr. K. S. Shelley, in support of the motion, said it was for an interim injunction to restrain the defendants from infringing their trade-mark "Osram" in connection with the sale of electric lamps. The complaint was that the defendants sold at their premises at East Parade, Leeds, lamps in cartons bearing the mark "Osmar."

Mr. Basil Drewe, for the defendants, denied any infringement. He said the name on their lamps was "Ozmar," not "Osmar," and the cartons were entirely different in the style of "get-up." There was no question of any deception.

His Lordship suggested that this was a case for an early trial of the action; he made no order on the motion but gave facilities for an early trial.

A Lamp Royalty Dispute

The hearing of the action brought by N. V. "Splendor" Gloeilampenfabrieken, Holland, against the Omega Lamp Works, Ltd., claiming £500 in respect of royalties (see our last issue, p. 789) has been continued by Mr. Justice Langton. On November 28th His Lordship adjourned the hearing until to-day (Friday).

The General Accessories Co., Ltd.

In the Chancery Division on Monday last Mr. Justice Bennett had before him an application by the General Accessories Co., Ltd., for sanction to a scheme of arrangement. There was also before the Court a petition for the compulsory winding-up of the company.

Mr. Christie said he appeared for the company in support of the scheme of arrangement between it and its creditors. He did not now ask for the company to be wound up. The winding-up petition was a friendly one whilst the scheme was being developed. The principal creditors supported the scheme. The company had had serious losses in 1930-31, but apart from this the business had been successful. There was no opposition to the scheme, which provided for certain payments in cash and certain debenture stock, £16,000 of first mortgage debenture stock being created for that purpose.

His Lordship sanctioned the scheme and dismissed the petition.

A Radio-Gramophone Patent

In the Chancery Division on November 29th, Mr. Justice Eve had before him, on a matter of procedure, an application by the Western Electric Co., Ltd., now known as Standard Telephones & Cables, Ltd., to the Comptroller-General of Patents, for leave to amend the specification relating to radio-gramophones under letters patent dated March, 1922, and a petition by Messrs. A. C. Cossor, Ltd., for revocation of the patent granted to the Western Electric Co., Ltd.

Mr. Moritz, K.C., who appeared for Messrs. A. C. Cossor, Ltd., asked that in order to avoid a circuity of proceeding, the patentees' application to amend their specification and the petition for revocation should be heard together.

His Lordship having heard Mr. Trevor Watson, K.C., who represented the patentees, directed that the petition for revocation should stand over generally or until the application to amend was disposed of, there being an undertaking by the patentees to proceed with their application to amend their specification with all due diligence.

The Radiovisor Litigation

Radiovisor (Foreign and Colonial), Ltd., has given notice of appeal from the judgment of Mr. Justice Lawrence in favour of Radiovisor Parent, Ltd., on the claim of the plaintiffs for about £200,000 damages and the return or cancellation of 120,000 £1 shares in the plaintiff company, for alleged fraudulent misrepresentation, in the disposal to them by the defendants of the foreign and Colonial rights on a selenium light bridge. The judgment was reported in our last issue (p. 789).

A New High-head Pumped-storage Plant

In connection with the article under the above heading in our last issue, we are asked to mention that the hydraulic part of the Schluchsee-Hausern plant, *i.e.*, the turbines and

storage pumps, was supplied jointly by the Escher Wyss Co., Zurich, and the J. M. Voith Co., Heidenheim.

A correspondent has sent us a photograph (reproduced above) of the works in course of erection.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources, Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Marryat and Place

The personnel of the well-known engineering and contracting firm, Marryat & Place, of Hatton Garden, E.C., forms the subject of our group of portraits under "Driving Forces in the Industry," page 809, this week. The business was founded by Mr. Marryat in 1891, and shortly afterwards he was joined in partnership by Mr. Harry Place, who devoted himself to installation work, whilst Mr. Marryat was more particularly interested in the development of electric lifts, furnaces, and other industrial applications of electricity. Mr. Place died in 1918. Mr. John Marryat joined the firm in 1930 after a course of business training with the General Electric Co., Ltd., and Mr. Robert Marryat, B.Sc., in 1928. Mr. J. G. Cant was apprenticed to the firm in 1910, and is now manager of the maintenance of machinery department, having charge of some 7,000 machines. Mr. W. A. Matthews is chief outside representative in the contracts department. He also manages the firm's "sandwich" scheme of apprenticeship training, by which every boy spends one-third of his time in college. Mr. H. Willmer, after a varied experience on the North East Coast, was appointed by the firm in 1919 to deal with the rapid development of factory installations after the war. He is manager of a department dealing with factory requirements, and is also the firm's expert for church lighting and organ blowing. Mr. G. A. Wedge joined the firm in 1924 as illumination expert. Mr. A. F. Goodwin, after an apprenticeship and lengthy subsequent experience with the G.E.C., practised as an electrical contractor in the City before joining the firm in 1927 to look after installation contracts in institutions and public buildings. The firm employs about 280 hands. The Neon Lights business, which was developed in this country by the firm, has since been absorbed by the Claude-General Neon Lights, Ltd., of which Mr. Marryat is a director.

Another "Northmet" Showroom

The Wood Green Urban District Council has passed plans for the erection of a showroom in Avenue Parade for the North Metropolitan Electric Power Supply Co.

A Large Country-house Switchboard

The accompanying picture shows the main switchboard supplied for West Dean House, near Chichester, by Messrs. S. Bell and Co., Ltd. It is typical of a number recently supplied by the company for large private houses, and indicates the magnitude of the loads which these buildings now provide.

An industrial-type switchboard in a country house

The equipment is an industrial-type panel fitted with eleven "Botrade" 60-A combined switch fuses and bus-bar chamber with an entry for the main cable. The installation in West Dean House was carried out by Mr. T. F. Lummus, of Chichester.

Guildford Contractors and Corporation Hire Schemes

At a recent meeting of the Guildford Corporation Electricity Committee the borough electrical engineer reported that he had been approached by the local wiring contractors as to the possibility of their assisting the Corporation's schemes for the hire and hire-purchase of electrical appliances. After discussion the Committee decided that the contractors should be allowed to purchase, to show in their showrooms as demonstration models, such appliances as could be hired or hire-purchased from the Corporation. In the event of the contractors not desiring to purchase for their showrooms any particular appliances, they are to be given the opportunity of bringing their customers to the Corporation's showroom to inspect the appliances there. The appliances to be hired or hire-purchased to customers are to be approved by the Corporation only, and the contractors will be paid 5 per cent. of the net cost of all appliances sent out on hire or hire-purchase in respect of agreements negotiated by them.

An Important Steel Scheme

Messrs. Stewarts & Lloyds, Ltd., have announced their decision to proceed with a scheme, which it is estimated will cost £3,300,000, to restart in this country the manufacture of basic Bessemer steel. The company has obtained control of an orefield in Northamptonshire which contains reserves to the extent of 500,000,000 tons and the new plant will be erected at Corby. It is also proposed to erect further plant on the same site so that the raw material can be converted into the finished steel tube. The money necessary for the scheme will be provided by a financial group through the Bankers' Industrial Development Co., Ltd., and later it is intended to make an issue either of shares or debenture stock.

China's Electrical Imports

The following particulars of the imports into China of electrical goods last year are taken from the recently issued annual volume of the Chinese Maritime Customs. A note of increases or decreases compared with the previous year is added. In spite of internal disorders every group shows an increase, and the share of Great Britain, except in materials and fittings, was fairly well maintained. The Haikwan tael averaged in 1930 1s. 10½d., and in 1931 1s. 6⅞d.

	1931. Thous. Hk. tls.	Inc. or dec. as compared with 1930. Thous. Hk. tls.
Electrical materials and fittings—		
Total	18,411	+ 1,111
From Hong Kong	1,938	+ 834
„ Great Britain	1,877	− 192
„ Germany	2,736	+ 27
„ Japan	6,240	+ 88
„ United States	3,661	+ 56
„ Belgium	805	+ 357
Machinery for electric power stations—		
Total	3,677	+ 94
From Hong Kong	158	− 108
„ Great Britain	1,193	+ 464
„ Germany	590	+ 39
„ Czechoslovakia	259	+ 256
„ Japan	434	+ 178
„ United States	432	− 685
Telegraph and telephone materials—		
Total	9,534	+ 2,435
From Hong Kong	1,382	+ 1,168
„ Great Britain	975	+ 274
„ Germany	940	− 1,054
„ Belgium	2,903	+ 1,441
„ France	1,213	+ 1,140
„ Japan	730	+ 76
„ United States	850	− 854

The Contractors' Dinner

The annual dinner of the Electrical Contractors' Association is to be held on January 17th.

Turbine Manufacture in Holland

According to Dutch newspaper reports quoted by *Reuter's Trade Service*, an agreement concerning patents has been concluded between the Werkspoor N.V., of Amsterdam, and the Heemaf N.V., of Hangelo, on the one hand, and Svenska Turbin-Fabriks A.B. Ljungström, on the other, permitting the manufacture of Ljungström turbines in Holland.

Dutch Lamp Import Restrictions

Interested circles in Holland recently asked for a restriction to be imposed upon the imports of foreign wire filament lamps, but the application was refused at the time. Since then the imports have so largely increased, particularly from Japan, that the Government has now placed a limit on the imports for a period of three months from November 1st. The permissible quantity for this period, provided that applications for permits are granted, has been fixed at 10 per cent. of the average imports in the corresponding period of 1930 and 1931.

Another American Factory

Surrey County Council Town Planning Committee has granted permission to Mr. R. P. Brown, of Philadelphia, U.S.A., to erect a small electrical instrument factory in Kingston By-pass Road, near Byron Avenue.

Electrical Exhibition at Formby

On November 25th a three days' electrical exhibition was opened at Formby in charge of Mr. J. Huxley, of the G.E.C., and to signalise the occasion the Council office was floodlighted at night. Mr. James Scott, who is consulting electrical engineer and manager, and also Mayor of Bootle, at the opening

described a scheme for an all-electric house, in which would be provided free, the wiring, lighting, cooker, wash-boiler, water heater, four radiators, an electric iron and kettle, in a house, new or old, to consumers who wished to have them, on a charge of £2 10s. per quarter, which included the use of 240 kWh. For a small house the quarterly charge would be £2.

Recent Contracts

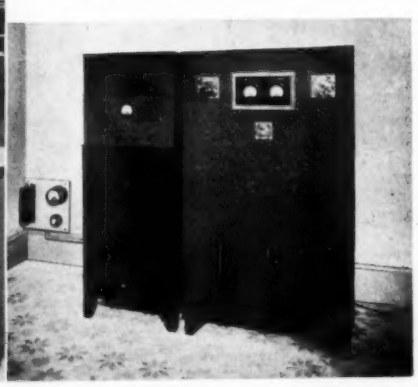
The accompanying illustration shows a motor-driven gas booster under construction in the Rugby works of the British Thomson-Houston Co., Ltd., for installation in the Provan gas works of the Glasgow Corporation. It is capable of delivering 34,000 cu. ft. of gas per minute, against a delivery pressure of 28in. water gauge, and is driven through speed-increasing double-helical gearing by a B.T.-H. a.c. variable-speed commutator motor. This motor has a speed range from 240 to 720 r.p.m. The maximum speed of the gas booster is 3,550 r.p.m. An outstanding feature of the equipment is that economical operation is possible over a wide range of gas conditions. The set is equipped with an automatic speed regulator for rotating the brush gear of the variable-speed commutator motor in either direction, to enable the gas to be supplied at any constant pre-determined pressure, or varied in accordance with requirements. The regulator is remote controlled by means of a pressure-responsive device connected to the gas main at a distance of 1,200 yds. from the booster house.

The new double rectangular arm brackets used in the City of Westminster area for holding two street lighting lamps have been supplied with lowering gear manufactured by the London Electric Firm. The wire rope passes inside the rectangular bracket in a very simple but effective way to prevent chafing of the cables and to obviate the unsightliness of outside fixing.

Messrs. C. A. Parsons & Co., Ltd., have received an order for a turbo-type alternator and exciter of 6,000-kW capacity from the N. V. Koninklijke Maatschappij "De Schelde," for the Flushing Electricity Works.

The Chilean Radio Market

Chile is not a very favourable field even in normal times for the expansion of trade in radio sets. The announcement in a Department of Overseas Trade report (reference A. 11593) that the country has suffered more severely than most with regard to the world trade depression does not make matters any more encouraging. Generally speaking, radio is still in its infancy in Chile, and the local view is that there may be some prospect for United Kingdom radio trade when the new Chelmsford station is in operation. The Chilean public prefers, other things being equal, to buy British goods, but if United Kingdom radio manufacturers wish to obtain a footing in the market it appears essential that they should produce models with American type valves and sockets. It is hardly likely that competition can increase at least for some years to come, since it is already as great as the market can stand.



In the Swiss Federal Parliament House each of the 200 chairs now has a "Marconiphone" microphone mounted in front of it, while a loudspeaker is provided for each pair of delegates. The amplifying panel is to be seen below

For Sale

Messrs. Holman Brothers, Ltd., have d.c. motors and starters for disposal.

Sub-station equipment is offered for sale by Kingston-on-Thames Corporation Electricity Department.

(See our advertisement pages to-day.)

Trade Announcements

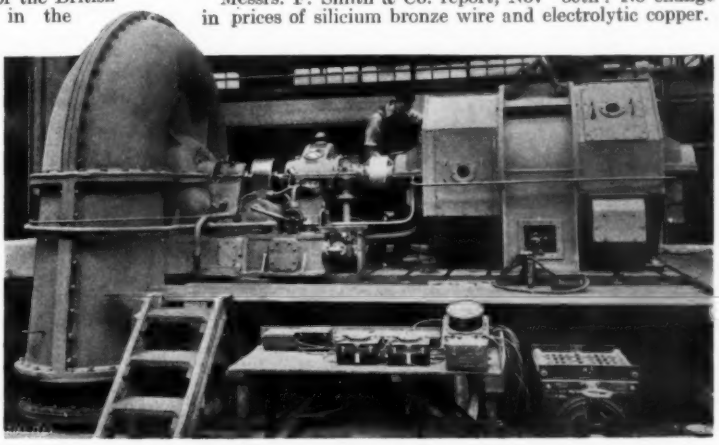
The Telegraph Construction & Maintenance Co., Ltd., informs us that it is relinquishing its Wharf Road premises, and is combining the whole of its works at Enderby's Wharf, East Greenwich, S.E.10. The use of the name "Gutta Percha Co." is to be discontinued.

New premises have been opened by Mr. E. Summers, electric light and power contractor, at 3, Drake Circus, Plymouth.

Messrs. Claude Lyons, Ltd., of Liverpool, have been appointed Northern distributors by the Wego Condensers Co., Ltd.

Prices of Materials

Messrs. F. Smith & Co. report, Nov 30th: No change in prices of silicium bronze wire and electrolytic copper.



A B.T.-H. gas booster for Glasgow

Messrs. Edward Till & Co. report, November 30th: India-rubber, Para fine, no change.

Messrs. James & Shakespeare report, November 30th: Copper bars (best selected), sheet and rod, no change. English pig lead, £13 5s., 5s. dec.

The E.P.E.A. 1933 Diary

The Electrical Power Engineers' Association has published its pocket diary for 1933. This is neatly bound in navy blue morocco leather, and in addition to the usual postal information, &c., contains particulars regarding the Association, a number of maps, and considerable technical data. A useful addition is a perforated thumb index to the diary, while the pages provided for notes have an alphabetical thumb index.

Conditions in Uruguay

A confidential memorandum containing a general summary of the economic situation in Uruguay on September 30th, 1932, prepared by H.M. Consul at Montevideo, has been received and issued by the Department of Overseas Trade to firms whose names are entered on its Special Register. United Kingdom firms desirous of obtaining copies should apply to the Department, 35, Old Queen Street, S.W.1, quoting reference number C.X. 4034.

Electrical Carnival at Newcastle

Under the auspices of the Northern Counties E.D.A. Area Committee the fifth annual electrical carnival will be held in the Oxford Galleries, Newcastle, on Friday, January 13th. It is anticipated that 1,000 guests will be present. Mr. A. C. Cramb, Director of E.D.A., and Mrs. Cramb will receive the guests. Early application for tickets (5s. each) should be made to Mr. A. Parkin, Area Officer, Commercial Union Buildings, Pilgrim Street, Newcastle-on-Tyne.

Social Events

The Dramatic Section of Callender's Athletic & Social Club did well on Tuesday evening when they presented the three-act farce "Double or Quit" (John Charlton). King George's Hall, W.C.1, was well filled and interest and mirth were sustained throughout the performance. Lady Callender and her son, Mr. T. Callender, and Mr. and Mrs. T. Petersen, were present. At the conclusion Mr. H. Foulds, founder of the Section and secretary of Callender's Company, once again presented bouquets to the lady artistes and introduced the producer, Mr. Percy Mackenzie, who gracefully responded. We are grateful to "Teddy," "Playful," "Dorking," "Dooley," and indeed everybody, not forgetting the business manager, Mr. E. J. Hart, for an evening's merriment.

During the week ended November 26th the British Thomson-Houston Co.'s Amateur Operatic and Dramatic Society presented at Rugby "Trial by Jury" and "The Pirates of Penzance." These two popular operas provided excellent entertainment and the house was filled at every performance. The Society has been producing Gilbert & Sullivan operas since 1912.

About 120 members of the staff of Messrs. John Shaw & Sons

(Wolverhampton), Ltd., attended the annual dance of the firm, at the Star and Garter Hotel, Wolverhampton, on November 24th.

Mr. F. W. Leake, of the Calcutta branch of British Insulated Cables, Ltd., has sent us a photograph (reproduced herewith) of representatives of electrical plant and cable manufacturers, who took part in a golf match on the Royal Calcutta Golf Club course on October 13th. The teams lunched with

Electrical golfers in Calcutta

the "Cables" leading by 6½ to 5½, but in the afternoon they won five of the two-ball foursomes and halved the other. The electrical plant team comprised Messrs. Horn, George Bargrett, Hamilton, Dowson, Chandler, Champness, Banks, Preston, Humphrey, Brooks and Penn, electric cables being represented by Messrs. Thomas, Maguire, Pilcher, Gunnis, Harris, Leake, McIntosh, Morgan, Stanley, Wardrop, Alcock and Shaw.

The Manchester Magnet Amateur Dramatic Society (G.E.C.) presented "Nothing But the Truth," by James Montgomery, at the Milton Hall, Manchester, on November 19th. A strong cast made the most of the many amusing situations which arise in this farce, and the performance was well received by a large audience. At the conclusion Mr. A. E. Jepson (assistant branch manager) voiced the general disappointment at the absence of Mr. J. H. Farthing (branch manager) owing to ill-health. His son, however, took a prominent part in the presentation.

Swansea Contract Terms

The Swansea Electricity Committee was recently asked by Messrs. C. A. Parsons & Co. to amend the financial terms of their contract on the ground that the stipulated conditions would not be acceptable to the British Electrical and Allied Manufacturers' Association. The stipulated terms provided for the payment of 80 per cent. of the contract price on the delivery of the machinery to the site, 15 per cent. within a month, and the remaining 5 per cent. within twelve months. Messrs. Parsons suggested the payment of 60 per cent. of the contract price in three instalments during manufacture. It was pointed out that such an alteration would involve the Committee in the payment of about £4,000 additional interest and it was decided to refuse the request.

Long Service

The directors of British Insulated Cables, Ltd, a few years ago decided to present gold medals to all employés who had completed twenty, thirty, or forty years of unbroken service with the company. Up to the present time 672 20-year, 342 30-year, and 35 40-year medals have been issued, a total of 1,049. Few, if any, other industrial concerns can equal this record.

Selling Vacuum Cleaners

We have received from British Electric Domestic Appliances, Ltd., a pamphlet setting forth details of its authorised dealer scheme for "Mary Ann" vacuum cleaners. Under this scheme the company inserts in its national newspaper advertisements the names of wholesalers and authorised dealers in its machines through whom alone sales are made. It is also noted from the pamphlet that the company is exhibiting at the British Industries Fair, Birmingham, and the Ideal Home Exhibition next year.

New Catalogues and Lists

Revo Electric Co., Ltd., Tipton, Staffs.—A folder illustrating different types of "Revo" water heaters, with diagrams showing various methods of installing them. Also a leaflet on fires.

Benjamin Electric, Ltd., Tariff Road, Tottenham, N.17.—An illustrated folder dealing with the new "Benflux" domestic reflector.

Sun Electrical Co., Ltd., 118 & 120, Charing Cross Road, W.C.2.—The company's 1932-33 domestic electrical appliances and heating catalogue. It has 168 pages and is profusely illustrated.

Cressall Manufacturing Co., 31 & 32, Tower Street, Birmingham.—Publication No. 43, illustrating and describing a very comprehensive range of regulators, rheostats and resistance apparatus.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—Catalogue No. W.B.5, giving full details of the complete range of "Henley" compact type link disconnecting boxes.

Magnavox (Great Britain), Ltd., 89, Kingsway, W.C.1.—Leaflet No. D.636, giving full particulars of new "Magnavox" loudspeakers.

Midland Electric Manufacturing Co., Ltd., Birmingham.—A leaflet announcing a 20 per cent. reduction in the price of the "Auto-Memota" push-button starter for squirrel-cage motors of from ½ to 5 h.p.

Premier Electric Heaters, Ltd., Keeley Street, and St. Andrew's Road, Birmingham.—A 68-page general catalogue (No. L.225) of "Premier" electric heating appliances.

British Isothermos Co., Ltd., Thames House, S.W.1.—The autumn number of the "Isothermos Technical Bulletin," giving particulars of recent improvements in railway bearing lubrication.

Superlamp, Ltd., 92/94, Paul Street, E.C.2.—A 216-page illustrated catalogue of electrical apparatus, fittings and accessories.

Hopkinsons, Ltd., Huddersfield.—List No. C.3210, giving details of the company's centrifugal purifiers.

Drayton Regulator & Instrument Co., Ltd., West Drayton, Middlesex.—Lists No. 107c and 187, dealing respectively with circular-chart type temperature and pressure recorders, and a selection of chart ranges covering some of the most usual requirements.

Bankruptcy Proceedings

Wholesale Radio Components Co., radio dealers, 9, Victory Parade, Sutton Road, Prittlewell, Essex.—The public examination was held on November 24th at the Petty Sessions House, Southend, when the statement of affairs presented showed liabilities amounting to £437 against assets of £6. It appeared that the business was carried on by R. T. G. Mason and W. T. Burrell, and that the trading had lasted barely five months. The Official Receiver pointed out that the losses of the business were about £90 a month and asked why the business was continued. Mason replied that the sales were going up every week, and if the business had been continued the turnover would have been large enough to overcome the expenses. The separate estate of Mason disclosed liabilities of £190, and that of Burrell liabilities of £199. The examination was adjourned.

T. H. D. Pope, electrical engineer, 119, Commercial Road, Swindon.—The adjourned examination was held recently at the County Court Buildings, Swindon. Debtor said that the turnover of the business had averaged over £2,000 per annum for several years, but that the sales had fallen off latterly. He attributed his failure to his premises being closed during a period of reconstruction after a fire, and to loss of custom due to acute unemployment in the town. The examination was further adjourned.

J. R. Lister (trading as Roland Radio), 6, Watford Way, Hendon.—The first meeting of creditors was held last week at the London Bankruptcy Buildings, when it was disclosed that the liabilities amounted to £580, against assets of £307, inclusive of the lease of the premises, valued at £250. The failure was attributed to bad trade, competition, and lack of capital. A resolution was passed for Mr. Waller Broad to wind-up the estate as trustee.

A view of the new Philips Industrial showroom at 145, Charing Cross Road, W.C.2, where a wide range of technical electrical equipment, including rectifying valves, rectifiers, amplifiers, microphones and talking apparatus, is available for demonstration

R. Braham, condenser maker, 1, Mallow Street, E.C.—The public examination was held at the London Bankruptcy Court on November 23rd before Mr. Registrar Warmington, the accounts showing liabilities of £2,232 against assets of £5. The debtor attributed his position to losses arising from rescinded or uncompleted contracts, the fall in prices, and loss of business through lack of capital. The examination was concluded.

F. Finch, radio engineer, 2a, Fishergate Hill, Preston, Lancs.—The public examination was held recently at the Sessions Hall, Preston, when the statement of affairs showed liabilities of £329 and assets of £179. The examination was adjourned for closing.

H. C. Mealing (Yorkshire & Lincolnshire Electric Development Co.), electrical trader, 73, Lawrence Street, York.—Public examination December 22nd at the Law Courts, Clifford Street, York.

E. L. Spring, electrical and wireless dealer, 61, Dovecot Street, Stockton-on-Tees.—Last day for receiving proofs for dividend December 7th. Trustee, Mr. C. L. Townsend, 80, High Street, Stockton-on-Tees.

E. A. Blest, radio dealer, 71a, Halesowen Road, Old Hill.—First and final dividend of 2s. 9½d. in the £, payable November 29th at the Official Receiver's office, 1, Priory Street, Dudley.

H. L. Wood, electrical engineer, 7, Taswell Road, Southsea.—Supplemental dividend of ¾d. in the £, payable November 29th at the Official Receiver's office, 87, High Street, Portsmouth.

Bradleys, electricians, 234, Vauxhall Bridge Road, S.W.—Receiving order made November 11th on a creditor's petition. First meeting December 5th, and public examination, February 15th, both at Bankruptcy Buildings, Carey Street, W.C.

Company Liquidations

Electric Service, Brighton, Ltd., 42h, Upper Russell Street, Brighton.—The statutory meeting of creditors was held recently at the offices of Mr. A. E. Orbell, 6 and 7, Old Steine, Brighton, when a statement of affairs was submitted showing liabilities of £154 and total assets of £96, leaving a deficiency of £58 as regarded creditors. The shareholders had previously met and passed a resolution for voluntary liquidation, with Mr. Orbell as liquidator. No resolutions were passed by the creditors, and consequently Mr. Orbell continues as liquidator.

Beam, Ltd., electrical factors, 35, Farringdon Road, E.C.—The statutory first meetings of the creditors and shareholders were held on November 22nd at the Board of Trade Offices, W.C. The winding-up order was made on October 17th upon the petition of creditors. The Official Receiver reported that at the beginning of this year the company's name was removed from the factors' list of the Radio Valve Manufacturers' Association, and efforts to have it restored proved futile. The name was also struck off the list of subscribers to the fair trading agreement, which applied between manufacturers and wholesalers for the sale of radio receiving sets and radio-gramophones. The failure was attributed to shortage of working capital, trade depression, and the removal of the company's name from the factors' list. No statement of affairs had been lodged, but the liabilities were estimated at £9,566, against assets of £619, the main item being book debts for £576. The Official Receiver, who was left in charge of the liquidation, added that he had received an offer of £20 for the company's trade mark and goodwill.

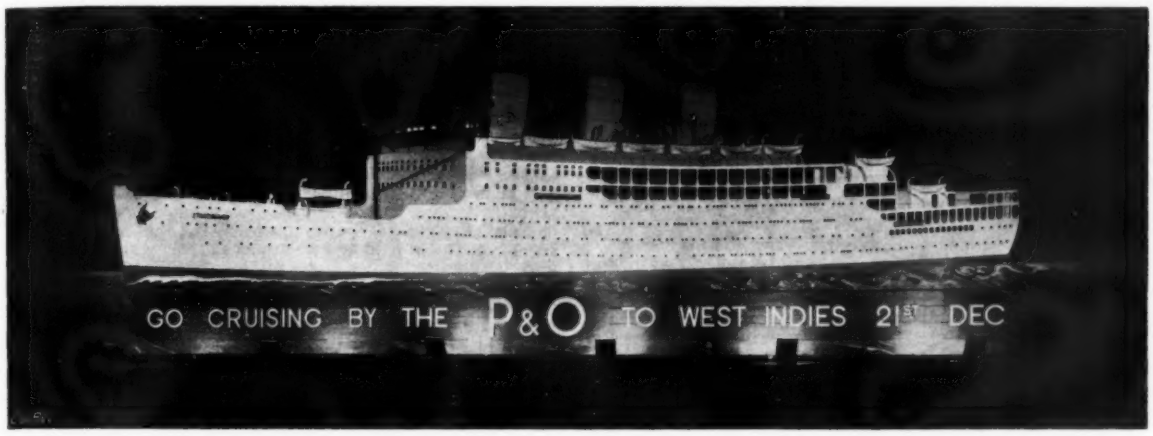
C. Haddon Poupard & Co., Ltd., radio engineers, 50a, Cranbrook Road, Ilford.—The statutory meeting of creditors was held recently at Winchester House, E.C., when Mr. Bishop, the company's accountant, said that he had prepared an approximate statement of affairs which disclosed liabilities of £1,479, of which £574 was due to the trade. There was a deficiency so far as the creditors were concerned of £1,442. The matter was discussed at considerable length and a representative of the Wireless and Allied Trades Association said that he represented a number of creditors, and he proposed that the estate should be administered in compulsory liquidation. That proposal was seconded and was carried by a large majority. The meeting then terminated.

Crypto Electrical Co., Ltd.—Meeting, December 28th, at the offices of Lancashire Dynamo & Crypto, Ltd., Trafford Park, Manchester, to receive an account of the winding-up by the liquidator, Mr. J. H. Dunbar.

Polo Battery Manufacturing Co., Ltd.—Winding-up voluntarily. Liquidator, Mr. P. S. Edwards, 31, Queen Victoria Street, E.C.4.

Kinetic Wireless & Electric Supplies, Ltd.—Meetings, January 9th at 36 and 37, Queen Street, E.C., to receive an account of the winding-up by the liquidator, Mr. S. P. Child.

R. C. Seal & Co., Ltd.—Meetings, December 28th, at 4, Charterhouse Square, E.C., to receive an account of the winding-up by the liquidator, Mr. E. H. Hawkins.



A model ship sign, 114 ft. in length, recently erected by the P. & O. Steam Navigation Co. on a site between Hayes and West Drayton, is floodlighted by six Siemens units fitted with 1,000-W gasfilled lamps

Dissolution of Partnership

Pearson Bros. & Co., wireless component manufacturers, 90, Victoria Street, S.W.—Messrs. J. Lewis, B. M. Pearson and L. C. Pearson have dissolved partnership.

Russian Electrical Notes

DURING the first ten months of the current year power stations in the U.S.S.R. produced 6,436.9 million kWh of electricity, which is 37 per cent. more than during the corresponding period of last year. During October the output was 729.4 million kWh, *i.e.*, 25.5 per cent. more than in October, 1931, and 13 per cent. more than in September, 1932. By October the total capacity of the stations was 2,497,700 kW, as against 1,709,000 kW in the corresponding month last year.

Provision was made in the plans of the Glavelectro for 1,056,000 kW of new generating plant to be put into commission during 1932. Between January 1st and September 1st over 500,000 kW was put into operation and the starting of another 300,000 kW is more or less assured during the current quarter. Probably a further 75,000 kW may also be included.

Manufacturing Industry's Progress

The Kulakov Works in Leningrad have commenced the manufacture of telegraph apparatus, designed by an engineer of the Commissariat of Communications, capable of transmitting 400-450 signals per minute. The existing high-speed telegraph apparatus transmits 200-220 signals per minute.

The "Dynamo" Works in Moscow have just delivered the first two electric locomotives. The first of 132 tons is a copy of the locomotive supplied by the General Electric Company of America, and the other of 114 tons is of Russian design and construction. The body of the latter is of welded construction and the arrangement of the equipment inside the locomotive is on novel and improved lines.

The first of several works for the manufacture of alkaline accumulators has been recently put into operation.

An e.h.p. oil switch having a rupturing capacity of 2,500,000 kVA has just been delivered by the "Electroapparat" Switchgear Works in Leningrad. This breaker is intended for the transmission line from the Svir hydro-electric station. The "Electroapparat" Works commenced the manufacture of oil switches in 1928, but it is already producing fourteen types of oil breakers, including large-capacity switches for blooming mills and explosion-proof iron-clad switches for mines.

Electric Welding Developments

The manufacture of electric welding machines has made considerable progress in Russia this year. The machines are chiefly made at the "Electric" Works in Leningrad, and among the machines which have been delivered, or are on the point of completion, are the following:—Welding generator capable of giving 1,500 A at 60 V and intended for the simultaneous working of 10-15 welding posts; automatic heads for welding with metal electrodes, in which the regulation of the arc and feeding of the electrode is fully automatic and is effected by means of a relay and an electromagnetic mechanism actuated by the variation of the voltage in the arc; semi-automatic machines with a 25-kVA transformer for the welding of cycle rims; automatic spot welders of 25 kVA capacity motor operated with parallel movement of the electrodes, and capable of making 3,000 spots per hour; and butt welders for welding sheets 1,300 mm. long and 1.5 mm. thick.

The most interesting achievement, however, is the construction of three machines which have been named "electro-welding bloomings," for the automatic production of steel tubes with welded seams. This complicated machine is equipped with three motors. It forms the tube from a low carbon steel ribbon with the seam open, and a rotary-type welding transformer heats the two edges along the seam with such a speed that the edges are instantaneously butt-welded. The burrs on the outside surface are then removed, the external diameter of the tube calibrated and the tube cut into requisite lengths. The work of the blooming is fully automatic. Tubes of 20 to 60 mm. diameter and 0.6 to 2 mm. will be produced on these machines. The output is stated to be 18 metres of tubing per minute.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—ELECTRIFICATION OF THE MEARNS VILLAGES.—The Electricity Committee has approved a proposal to extend mains to supply villages in the Mearns. The success of the scheme will depend to a great extent on free wayleave facilities being given by the proprietors of the land over which the lines will pass. The estimated cost of the scheme is £3,642.

Beckenham.—REDUCED COOKER CHARGES.—The Urban District Council has decided to make a reduction varying from 1s. to 2s. per quarter in the rentals of old-type and renovated cookers.

NEW HEATING TARIFF.—A new charge of 1d. per kWh is to be introduced for shop and business heating purposes, provided that the heating is discontinued at 4.30 p.m.

Belgium.—A BID FOR THE COOKING LOAD.—With the object of encouraging electric cooking a Belgian supply undertaking is offering to install cookers in houses for a month's free trial, the only cost to the user being that of the electricity consumed. If the householder decides to keep the cooker a hiring charge is added to the pediodical account for electricity consumed.

Bingley.—CHRISTMAS ILLUMINATIONS.—So successful were the street electrical illuminations in the recent Bingley shopping festival that a ballot of shopkeepers is being taken with a view to their repetition during December to stimulate Christmas trade.

Birmingham.—PROGRESS CONTINUES.—The results of the Electricity Department's trading for the half year ended September last show that electrical development in Birmingham continues. The electrical output during the half year has increased by 13½ per cent. over the corresponding period of 1931, while the number of new consumers continues to expand, 1,075 having been added during October. The number of additional premises connected was over 12,000 during the year to date, and a new record was recently recorded, when in one day the output from the power stations exceeded 2,179,000 kWh.

Blackburn.—PRICE REDUCTION.—The decision of the Corporation to remove a 10 per cent. charge on electricity, imposed in 1926 after the coal strike, will mean a concession to consumers of £5,000 for the quarter ending March 31st, 1933, and £15,000 for the full year. The reduction has been made possible by economies in generation and distribution and increased output resulting from the larger number of consumers. It will probably occasion a slight loss on the operation of the Department for the current year.

Blackpool.—EXTENSIONS.—The Electricity Committee is to proceed with the extension of mains in Layton, Marton, and other districts, thus providing work for sixty men.

Bottesford.—ELECTRICITY IN THE SPRING.—A supply of electricity will be available for the village by next spring.

Cheshire.—THE WRENBURY HALL COLONY.—The Mental Hospital Committee is further considering the question of the electricity supply to the Wrenbury Hall Colony. The North Wales Power Co., Ltd., is prepared to supply current energy at 1d. instead of 1¼d. per kWh.

Chester-le-Street.—RESULT OF INQUIRY.—As a result of a recent inquiry the Minister of Transport has informed the Urban District Council that he does not think that there is sufficient justification for him to uphold its objection to the erection of overhead lines in the area by the North-Eastern Electric Supply Co.

Coventry.—EXTENSIONS.—The Electricity Committee is applying for sanction to the borrowing of £2,305 for plant and mains extensions.

COOKER HIRING.—A scheme for providing electric cookers on hire is to be introduced.

Croydon.—EXTENSIONS.—The Electricity Committee is to erect a sub-station in the Sylvan Hill district at a cost of £1,384, and extend mains at a cost of £5,804.

STAGE LIGHTING.—The Corporation is to improve the stage lighting at the Public Hall at a cost of £125.

Darlington.—REDUCTION OF HIRE CHARGES.—The Transport and Electricity Committee recommends that the hire charges for electric cookers and water heaters should be reduced by 25 and 33 per cent. respectively.

Enfield.—SUPPLY TO HOUSING ESTATE.—The Housing Committee has asked the surveyor to report upon the estimated cost of installing electric lighting in the houses on the Albany Estate.

Falkirk.—A SOLUTION OF THE ELECTRICITY PROBLEM.—A satisfactory solution of Falkirk's electricity problem is now practically assured. The Corporation's proposal to extend the electricity works, it will be remembered, was the subject of a public inquiry in June last, the application for the necessary powers to extend being then opposed by the Central Electricity Board. Eventually the Electricity Commissioners informed the Town Council that they had decided to refuse the application to extend, assuming that the Corporation would reopen negotiations for a bulk supply. Following an interview in London, the Electricity Commissioners, while still withholding their sanction for the extension of the plant, gave authority to Falkirk to negotiate for a partial supply from any authorised undertaking. Such negotiations were entered into with the Scottish Central Electric Power Co., from which the Town Council has now received an offer for a supply for a period of ten years, under which it will be possible for Falkirk to carry on its station with this additional supply without serious loss to the Corporation and without the need for increasing the existing low prices to consumers. The Falkirk Electricity Sub-committee has decided to delay further consideration of the matter until the publication of the grid tariff in 1933 so that it may then be satisfied as to the most satisfactory terms.

Farnham.—INSTITUTION INSTALLATION.—The Surrey County Council has authorised the obtaining of tenders for wiring the Institution for electric lighting and power supply.

France.—LARGE ELECTRIFICATION PROPOSALS.—The Paris correspondent of the *Manchester Guardian* says that the fourth committee of the Franco-German Economic Commission has considered an extensive plan for the electrification of certain countries, the details of which are to be discussed at the next meeting of the committee in February. M. Raymond Patenôtre, Under-Secretary of State for National Economy, stated that approximately £136,000,000 (at par) might be needed for the scheme.

THE SUPPLY INDUSTRY.—At a recent congress of industrial leaders, Chambers of Commerce and economists of the Midi District, resolutions were passed proposing (a) the control of the present rates for electricity, with the view to obtaining a reduction, and (b) the reorganisation of the Electrical Committee attached to the Ministry of Public Works. At the moment, they insist, the committee is not representative, and demand that it should be made up of the following: one-eighth members of Parliament; one quarter representatives of producers and distributors; one quarter representatives of makers of electrical apparatus; and three-eighths representatives from the consumers' associations.

THE KEMBS HYDRO-ELECTRIC SCHEME.—The new hydro-electric station at Kembs will include six 31,000-kW vertical turbo-alternators, five of which are expected to be in operation by next October and will give an output at the rate of 750 million kWh per annum. The station will form one of a series of eight which are to be constructed on the Rhine between Bâsle and Strasbourg, a distance of about 70 miles. As a part of the scheme it is proposed to improve transport facilities on the Rhine by making a canal; for this a dam is being built across the river with six reaches.

Glasgow.—LUMINOUS TUBE LIGHTING.—With reference to the decision to send a member of the Lighting Committee to a special meeting of the Illuminating Engineering Society in London in connection with luminous tube lighting, the inspector of lighting recently reported that if this system of lighting were adopted in Glasgow, there would be a considerable saving in costs, and that in the near future he hoped to make an experiment in two of the principal streets of the city.

Gravesend.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £420 to supply thirty-seven houses being erected by Mr. Newnham in Robinia Avenue, Northfleet.

Grimsby.—EXTENSIONS.—The Electricity Committee is to provide electricity to Habrough and South Killingholme at a cost of £8,731, and erect a sub-station in Vivian Avenue (£1,770).

Guildford.—MAINS EXTENSIONS.—The Electricity Committee is to carry out the following mains extensions: To the Merrow Estate where Messrs. R. Holford & Co. are to build 150 houses (£970); to the Snowdenham Hall Estate, Bramley, now being developed by Mr. A. B. Johnson, New Park, Cranleigh (£3,165); and to a new estate being developed by Messrs. Armstrong & Co. off Tillingbourne Road, Shalford.

COOKER HIRING.—A scheme is to be introduced for the hire of cookers to prepayment consumers who have had their houses wired under the assisted wiring scheme, the hire charge to be paid through a second prepayment meter. Wash boilers are also to be available for hire.

Harrogate.—BRIGHTENING UP THE TOWN.—A number of "Brighter Harrogate" schemes for attracting visitors for Christmas include a proposal to floodlight the whole of James Street, the spa's most fashionable shopping thoroughfare. The scheme is being carried out by the Electricity Department, and the shopkeepers will bear the cost.

Isle of Man.—ELECTRICITY BOARD APPOINTMENTS.—The Tynwald Court has granted leave to the new Manx Electricity Board to appoint a manager and secretary at a salary of £500, rising to £650, and to engage a consultant at an inclusive fee of £2,000. It is understood that the consultant will be Mr. J. M. Kennedy, of London, who was originally engaged by the Manx Government to advise on an electricity scheme for the island. Mr. Kennedy's advice was not acted upon entirely, but the scheme adopted by the Manx Government is based largely upon his proposals. A non-technical board of business men has been appointed to administer the undertaking, and work is to be put in hand immediately the two appointments mentioned above are made. It is hoped to have most of the work of installing the main transmission cables completed before the winter is over, and a loan of about £100,000 to finance the undertaking is to be floated shortly.

Lincolnshire and Yorkshire.—SUPPLY COMPANY'S NEW AREA.—A large portion of North Lincolnshire and the East Riding

is affected by the announcement of the registration of the North Lincolnshire & Howdenshire Electricity Co., Ltd. (see p. 836). The formation of the new company is the final stage in the scheme under which the Yorkshire Electric Power Co. will take over the supply in the districts mentioned and will increase its area to 2,637 square miles. A Special Order in connection with the scheme was granted to the Yorkshire Electric Power Co. this year on condition that the undertaking was transferred to the new company.

London.—ST. PANCRAS.—The Electricity and Public Lighting Committee recommends the installation of open-type air-washer cooling apparatus for the turbo-generating sets at the King's Road station at an estimated cost of £1,044. Extensions of mains costing £1,400 are to be carried out, and sanction has been received to loans of £18,138 for meters, £16,984 for house wiring installations, and £4,272 for consumers' electrical apparatus.

POPLAR.—The Electricity Committee proposes to build a sub-station at Orchard Place and provide a new a.c. supply at an estimated cost of £10,888.

Minehead.—ELECTRICITY FOR HOSPITAL.—The Minehead, Watchet and Williton Isolation Committee has accepted the offer of the Porlock and District Electric Supply Co., Ltd., for a supply of electricity for the hospital.

North-East Coast.—GRID PROGRESS.—Work is nearing completion on the erection of a chain of 500 "pylons" between Portobello, Scotland, and the Dunston power station. The work was started at Morpeth in March last by the Ferrocrete Construction Co. From there the company worked towards Portobello and then from Morpeth to Dunston; the foundations for the last four towers are now being laid at Derwenthaugh.

Oban.—PROGRESS OF ELECTRICITY SCHEME.—A number of the contracts in connection with Oban's £28,000 electricity scheme have been placed and work is expected to start immediately.

Padiham.—FURTHER REDUCTION OF CHARGES.—The Urban District Council has decided to make a further reduction in electricity rates during the next twelve months, one object being to attract new industries to the town. Charges for cinema supplies for all purposes are to be at the ordinary industrial power rate.

Plymouth.—MAINS EXTENSIONS.—The Electricity Committee has sanctioned cable extensions in five further streets.

Rawtenstall.—LOANS SANCTIONED.—The Corporation has received sanction to the borrowing of £10,000 for new services and £2,500 for meters.

Robin Hood's Bay (Yorks).—A SUPPLY AVAILABLE.—A supply of electricity provided by Whitby Urban District Council was recently inaugurated by the chairman of the Electric Light Sub-committee, Councillor Jackson. After the ceremony the Parish Church was floodlighted.

Seaham Harbour.—SPECIAL TARIFF FOR SCHOOLS.—The Electricity Committee is to give special terms to the Durham County Education Committee for the heating and lighting of two intermediate schools.

THE RYHOPE ROAD AREA.—The provision of electricity to premises in the Ryhope road area is under consideration.

Stirling.—SUPPLY FOR CAMBUS KENNETH.—An application has been received by the Town Council from the Scottish Central Electric Power Co. for permission to lay a cable to supply electricity to Cambus Kenneth.

Stoke-on-Trent.—EXTENSIONS.—The Electricity Committee is to extend mains to give supplies to Mossfield Colliery (at a cost of £1,900); the sewage works (£250); the Florence Colliery, Longton (£9,500); and to the proposed electric kiln at the Eastwood Works of Messrs. J. and G. Meakin, Hanley (£800). Sanction is being sought to loans of £2,000 for supplying the Hollywall Lane housing site, Goldenhill, and £5,000 for further assisted wiring installations. Permission has been received to borrow £6,000 for supplying electricity to the Meir Housing Estate and pumping station; and £790 for the erection of a sub-station in Pinnox Street, Tunstall.

Whitworth (Lancs).—REDUCTIONS IN ALL-IN TARIFF.—The "unit" charge under the all-in tariff is to be reduced from 1d. to ¾d., a minimum of £8 being fixed for the rateable value charge.

Wirral.—DEMAND FOR CHEAPER ELECTRICITY.—The Rural District Council is to ask Birkenhead Corporation to reduce the price of electrical energy from 25 to 10 per cent. above that in the borough. The Corporation has given a supply for five years, and the present agreement is for twenty-four years.

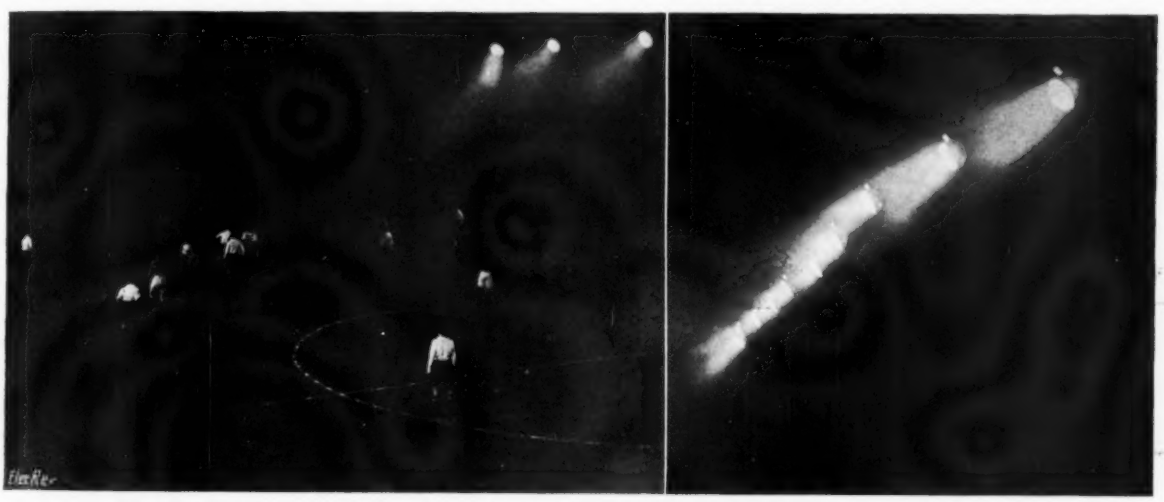
Worcester.—SCHOOL HEATING EXPERIMENT.—As an experiment the Education Committee has decided to have electric heating installed at the new Cherry Orchard School, at an estimated cost of £335.

Traction

Burnley.—TRANSPORT AMALGAMATION SCHEME.—For some months a scheme to amalgamate the passenger transport of Burnley, Nelson, and Colne has been receiving attention, and it is probable the question will shortly be considered by the full Town Councils. The scheme is not likely to meet with unanimous approval, particularly from Burnley, which would concede much without making any material gain. It is tentatively suggested the shares of surplus revenue and deficiencies should be as follows: Burnley, 19/32nds, Nelson 8/32nds, Colne 5/32nds.

Croydon.—TRACK RENEWAL.—The Tramways Committee is to renew tramway track at a cost of £1,800.

TRAFFIC CONTROL.—The provision of vehicle-actuated traffic signals, estimated to cost £1,412, is under consideration.



A demonstration of football by floodlight took place at the Arsenal ground last Monday. Twenty-two "Blaizolite" projectors (Engineering & Lighting Equipment Co., Ltd.) and incorporating 1,000-W lamps, were used, special reflectors being fitted to eliminate glare. The fittings were situated 30 ft. above the pitch, which was slightly smaller than the usual. A white ball was used

Czecho-Slovakia.—AN UNDERGROUND RAILWAY FOR PRAGUE.—Plans have now been completed for the construction of an underground railway in Prague at an estimated cost of £50,000,000. The scheme, however, has still to receive the approval of the financial experts before it can be proceeded with. The railway is intended at first only to connect three suburbs with the city. The undertaking is one of some difficulty, owing to the fact that Prague is built on rock and sand. —*Reuter* (Prague).

Darlington.—NO ALL-DAY TICKETS.—The Transport and Electricity Committee has decided not to issue 6d. all-day tickets for its trolley-bus services.

Germany.—A "CLOCK" TRAFFIC SIGNAL.—A new device in place of the amber traffic signal is being tried out at Cologne, where a two-coloured "clock" has been installed at a busy crossing. The four faces of the "clock" are divided into four sectors, the diagonally opposite ones being coloured respectively red and green. A continuously revolving double-length pointer occupies two minutes in traversing the green sectors and two minutes the red.—*Reuter.*

Hull.—TRAFFIC CONTROL.—The Works Committee is to provide automatic traffic-actuated signals costing £1,426 in Goulton Street, Cleveland Street and Holderness Road

Italy.—NEW TROLLEY-BUS SERVICE.—The municipal authorities of Venice have secured a concession to run a service of trolley-buses on the new road viaduct which is being built

between Venice and Mestre on the mainland, between which places the only communication has hitherto been by train. The Venice Corporation has leased the running of the vehicles to the Mestre Tramways Co., which has placed an order for the necessary vehicles with the Fiat Co., of Turin.

Java.—SUCCESS OF DIESEL-ELECTRIC LOCOMOTIVES.—The use of Diesel-electric locomotives on the railway between Bangkok, Alorstar, and Penang has been so successful that it is suggested that further similar locomotives should be obtained when required.

Leeds.—PROPOSED TRAMWAY EXTENSIONS.—The Corporation is applying to the Minister of Transport for a Provisional Order authorising it to operate tramways in Cardigan Road, North Lane, and Otley Road.

AN EXPERIMENTAL TRAMCAR.—A new streamlined tram with four 35-h.p. regenerative motors is being constructed for use experimentally on the Middleton route.

London.—TRAMCAR IMPROVEMENTS.—The L.C.C. Highways Committee proposes to spend £3,750 on upholstering the top-deck seats on 150 trams.

THE LONDON TRANSPORT BILL.—In the House of Commons on Tuesday the London Passenger Transport Bill reached the Committee stage. Among many amendments agreed to was one to increase the membership of the Transport Board from four and a chairman to six apart from the chairman.

ST. PANCRAS.—The provision of traffic-control signals at the junction of Tavistock Place with Woburn Place and Cleveland Street with Upper Marylebone Street is recommended by the Highways, Sewers and Public Works Committee.

TRAFFIC SIGNAL EXPERIMENT COMPLETED.—The fortnight's experiment of dispensing with the amber light in the traffic control installations in Oxford Street and at the junction of Sloane Street and Pont Street is now finished, and the Minister of Transport will shortly make known the conclusions arrived at.

Norwich.—CORPORATION TO ACQUIRE TRAMWAYS.—The City Council is to promote a Bill in Parliament providing for the transfer to the Corporation of the transport undertaking owned by the Norwich Electric Tramways Co.

Nottinghamshire and Derbyshire.—TROLLEY-BUSES.—The Nottinghamshire and Derbyshire Traction Co. is applying to the Minister of Transport for a Provisional Order authorising it to operate trolley-bus services in Ripley, Heanor, Shipley, Kimberley, Nuthall, Eastwood, Greasley and Ilkeston.

Rhondda.—TRAMWAY ABANDONMENT PROPOSAL.—A Parliamentary Bill providing for the substitution of buses for the tramway system is to be promoted by the Urban District Council.

Russia.—MAIN-LINE ELECTRIFICATION.—With regard to the electrification of the branch of the Baku-Batoum railway which leads up to the Suram pass to which reference was made in our last issue, it is stated that the traffic consists of trains of oil-tank wagons, for the hauling of which three powerful locomotives have hitherto had to be employed. Through the conversion it has been possible to replace fifty locomotives, which consumed 100,000 tons of oil fuel per annum, by eighteen electric locomotives. The transport capacity of the line has been increased by two to three times, while the speed is from 30 to 70 per cent. higher.

South Africa.—BLOEMFONTEIN TRAMWAYS.—The Bloemfontein Town Council is considering a drastic reduction in the tramway services, as it is faced with a loss this year of £12,000.

Sweden.—RAILWAY ELECTRIFICATION.—The work of converting the line between Falkoping and Nassjo to electric traction has now been completed, and public services are expected to begin shortly.

Torquay.—TROLLEY-BUSES.—A Bill providing for the operation of trolley-buses in place of trams is to be submitted to Parliament by the Torquay Tramways Co., Ltd.

Communications

Australia.—WIRELESS LICENCES.—During the year ended September 30th the number of wireless licences in Australia increased by more than 63,000. The total number in force at the end of September was 390,552, of which 150,415 were in New South Wales, 145,316 in Victoria, 30,051 in Queensland, 40,178 in South Australia, 14,291, in West Australia, and 10,301 in Tasmania. There were then 5.97 licences in force for every 100 persons in the Commonwealth.

France.—RADIO INTERFERENCE.—The municipal authorities of Amiens have recently made a by-law requiring all electrical equipment, such as household, commercial, or industrial electric machines and appliances, motors, electric tramways, luminous signs, electro-medical apparatus, lifts, cinematograph projectors, electric hair-dressing apparatus, &c., to be so equipped and installed that no interference with wireless reception shall be caused by the radiation of electrical oscillations. A period of six months is being allowed to users to adapt their appliances and installations to the new by-law.

Germany.—RADIO-TELEPHONY.—A telephone conversation took place this week between Perth, Western Australia, and Berlin. Communication was established as a test in preparation, says *The Times*, for the potential extension to Perth of the radio-telephone service now available between Berlin and Melbourne, Sydney, and Brisbane.

Great Britain.—RADIO RELAY EXCHANGES.—The Stoke-on-Trent General Purposes Committee has received applications from various companies for permission to establish a wireless relay service in the city, but the previous resolution of the Committee declining to allow the establishment of such services in the city was confirmed.

The Todmorden U.D.C. Highways Committee has informed the Todmorden Wireless Relay Co. that no useful purpose would be served by an interview with regard to the operation of a service in the town.

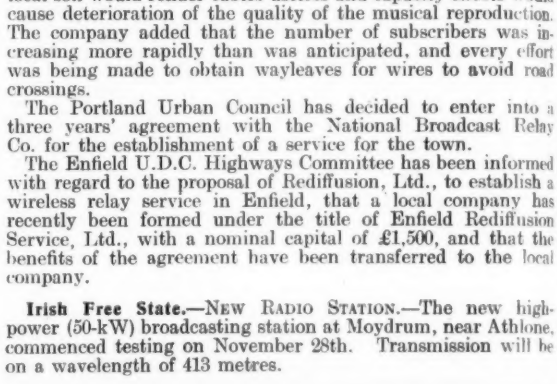
The Rayleigh Urban Council has received an application from the National Broadcasting Relay Co. for permission to commence a service.

The Bognor Regis Urban Council has suggested to the Wireless Rediffusion Service Co. that wires might be laid underground, but the company has replied that the acid nature of local soil would render cables useless and capacity effects would cause deterioration of the quality of the musical reproduction. The company added that the number of subscribers was increasing more rapidly than was anticipated, and every effort was being made to obtain wayleaves for wires to avoid road crossings.

The Portland Urban Council has decided to enter into a three years' agreement with the National Broadcast Relay Co. for the establishment of a service for the town.

The Enfield U.D.C. Highways Committee has been informed with regard to the proposal of Rediffusion, Ltd., to establish a wireless relay service in Enfield, that a local company has recently been formed under the title of Enfield Rediffusion Service, Ltd., with a nominal capital of £1,500, and that the benefits of the agreement have been transferred to the local company.

Irish Free State.—NEW RADIO STATION.—The new high-power (50-kW) broadcasting station at Moydrum, near Athlone, commenced testing on November 28th. Transmission will be on a wavelength of 413 metres.



The exhibit of Standard Telephones & Cables, Ltd., at the International Aeronautical Exhibition now being held at the Grand Palais, Paris. The equipment in the centre is an aerodrome transmitter giving two crystal-controlled wavelengths between 40 and 200 metres

India.—NEW RADIO STATIONS.—A new wireless station has been erected at Bedi Bunder for marine communication. The i.c.w. valve transmitter has a wave band of 10,000 to 20,000 metres, a power of 1.5 kW, and is of Marconi manufacture. News bulletins can now be received from Rugby and similar stations at Jam Nagar, about four miles from Bedi Bunder.

The Indian Radio & Cable Communications Co. is making good progress with the erection of the beam station for the Anglo-Indian radio-telephone service. The directional transmitter is at Kirkee, near Poona, and the receiver at Dhond. In this connection the trunk telephone network is being extended, chiefly to South India and possibly Ceylon. The service may be ready in January next.

Rhodesia.—BULAWAYO-LIVINGSTONE TELEPHONE.—Public telephone communication between Southern and Northern Rhodesia has been established. The new extension enables calls to be made between Bulawayo and Livingstone and between Salisbury and Livingstone. It is preliminary to the extension of the telephone system to practically all parts of Northern Rhodesia, so that it may ultimately be in communication with the Union of South Africa. At present the line is being constructed to Beit Bridge, whence it will link up with the Union lines.

Tunis.—NEW TELEGRAPH CABLE.—The laying of a new submarine telegraph between Marseilles and Oran, Tunis, has lately been completed. This is the second cable connecting the two cities, the first having been laid in 1892. France is now connected with North Africa by ten cables, all concentrating on Marseilles.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—January 24th. Post and Telegraph Department. January 24th. Resistances and reactances. (A. 11596.)*

Coventry.—December 16th. Public Health Committee. Electrical installation at the New Infectious Diseases Hospital, Pinley. (November 25th.)

Egypt.—CAIRO.—February 7th. Ministry of the Interior. Power station of about 660-kVA capacity. (A.X. 11599.)*

Epsom.—December 12th. Electricity Department. Kiosk and transformers. (See this issue.)

Fife.—December 14th. County Council. Various works, including an electric lighting installation, at the Strathmiglo housing scheme. Messrs. Walker & Pride, architects, Church Square, St. Andrews (deposit £1 1s.).

Glasgow.—December 7th. Education Department. Electrical work at Shawlands (New) Secondary School. Education Offices (Property Department), 129, Bath Street (£1 1s. deposit).

Leyton.—December 16th. Education Department. Electric lighting installation at Connaught Road School, Leytonstone. (November 25th.)

Lochgelly (Fife).—December 15th. Town Council. Electric lighting for Moor area housing scheme (86 houses). Mr. J. T. Scobie, architect, 1, Douglas Street, Dunfermline (deposit £2 2s.).

London.—ISLINGTON.—December 9th. Electricity Department. Mains extensions. (November 18th.)

Menston (Leeds).—December 19th. Electric lighting installation at Mental Hospital. Mr. R. Maxwell Bond, clerk to the Mental Hospitals Board, Wakefield (deposit £1).

New Zealand.—WELLINGTON.—January 10th. Post and Telegraph Department. 10,000 telephone transmitters. (A.X. 11587.)*

January 23rd. Twenty miles of v.i.r. wire. (A.X. 11609.)*

Northern Ireland.—BANGOR (CO. DOWN).—December 12th. Town Council. Electrically driven sewage pumping plant. Messrs. John Taylor & Sons, Caxton House, S.W.1 (deposit £5).

BELFAST.—December 5th. City Council. Electrically driven pump, with switchgear, &c. City Surveyor's Department.

Oban.—December 9th. Electricity Department. Generating station 11-kV switchgear. (November 18th.)

South Africa.—JOHANNESBURG.—December 22nd. City Council. 660- and 6,600-V cables. (A.X. 11607.)*

West Midlands.—December 9th. Joint Electricity Authority. Static step-down transforming plant for the Ocker Hill generating station. (November 11th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Alyth (Perthshire).—Town Council. Accepted. Installation of electric lighting in the streets.—D. H. Morris & Co.

Bishop Auckland.—Durham County Assistance Committee. Recommended. Electric refrigerator at poor law institution (£169).—Electricals, Ltd.

Croydon.—Sewage Committee. Recommended. Electric motor and pump at sewage pumping station (£157).—Gwynne's Pumps, Ltd.

Electricity Committee. Recommended. Chlorinating apparatus for circulating water (£245).—Paterson Engineering Co., Ltd. Oil purifier (£89).—Alfa Laval. One 300-kVA transformer (£206) and four 200-kVA transformers (£642).—British Electric Transformer Co., Ltd. Feeder panels (£564), switchgear parts (£322), and feeder switch (£228).—A. Reyrolle & Co., Ltd.

Fire Brigade Committee. Recommended. Maintenance of Ganewell-Beasley fire alarm system (£210 per annum).—Standard Telephones & Cables, Ltd.

Falkirk.—Town Council. Accepted. Electrical work at Carmuirs housing scheme (£1,443).—T. J. Irvine.

Glasgow.—Corporation Education Committee. Accepted. Electric lighting at St. Aloysius's (Springburn) School annexe (£358).—D. A. McLarty & Co. Electrical work at Croftpark Temporary School (£360).—Johnston, Park & Co.

Municipal Transport Committee. Accepted. Electric motor and controller for rail grinder.—Kelsall, Parsons & Co. Two pumps for subway.—Drysdale & Co., Ltd. Special track work.—Titan Trackwork Co., Ltd.

Grimsby.—Cleansing Committee. Recommended. Cells for electric vehicle battery (£107).—Chloride Electrical Storage Co., Ltd.

Electricity Committee. Recommended. Cables for twelve months.—Johnson & Phillips, Ltd. (£8,738); Metropolitan Electric Cable & Construction Co., Ltd. (£3,579).

Hull.—Telephones Committee. Recommended. 200 automatic table telephones (£512).—Automatic Electric Co., Ltd.

London.—FULHAM.—Electricity Committee. Condensing plant for first section of the power station extension:—Worthington, Simpson, Ltd., £38,130; Vickers-Armstrongs, Ltd., Scheme "A" (recommended), £38,661; Vickers-Armstrongs, Ltd., Scheme "B," £38,781; Metropolitan-Vickers Electrical Co., Ltd., £38,972; Belliss & Morcom, Ltd., £39,727; English Electric Co., Ltd., £39,754; R. & W. Hawthorn Leslie & Co., Ltd., £41,253; Mirrlees Watson Co., Ltd., £41,891 W. H. Allen, Sons & Co., Ltd., £42,890; C. A. Parsons & Co., Ltd., £42,945; Hick, Hargreaves & Co., Ltd., £43,787; Richardsons, Westgarth & Co., Ltd., £45,850; Harland & Wolff, Ltd., £46,369; G. & J. Weir, Ltd., £47,265; J. Samuel White & Co., Ltd., £58,600.

ST. PANCRAS.—Contracts and Stores Committee. Recommended. Wiring and fitting of Mornington Buildings (£298), and Cleveland, &c., houses (£226).—Bays & White. Wiring and fitting of Rowland House, Dickenson Street (£32).—K. B. Middleton.

HAMMERSMITH.—Highways Committee. Accepted. Traffic signals.—Forest City Electric Co., Ltd. (£541); Chance Bros. & Co., Ltd. (£224). Batteries for emergency lighting (£101).—Batteries, Ltd.

Morecambe.—Health Committee. Accepted. Electrical equipment at mortuary.—E. Backhouse, Ltd.

Newcastle-upon-Tyne.—City Council. Accepted. Electric wiring at Elswick Grange Poor Law Institution.—Falconar, Cross and Co., Ltd.

Seaham Harbour.—Electricity Committee. Accepted. Cables and boxes (£780).—Reid, Ferens & Co. Distribution pillars (£100) and street lighting standards (£108).—Fairless Engineering Co., Ltd.

Stoke-on-Trent.—Housing Committee. Accepted. Electric lighting and fittings at housing estates.—Hawley, Ingram and Co.; J. Whittaker; Edstan Electric.

Stranraer.—Town Council. Accepted. Electric lighting at housing scheme (£107).—J. K. Cowden.

Tynemouth.—Town Council. Accepted. Cable (£76).—Macintosh Cable Co., Ltd.

Woodford.—Urban District Council. Accepted. Automatic traffic signals (£440).—Automatic Electric Co., Ltd.

Forthcoming Events

Association of Supervising Electrical Engineers.—Friday, December 2nd. Griffin Hotel, Leeds. 7 p.m. "The New Scheme of Distribution of Electricity and its Effects." Mr. W. T. J. Atkins.

Institution of Electrical Engineers.—Monday, December 5th. Institution, London. 7 p.m. Informal meeting. Discussion on "Street Traffic Signals." Opened by Mr. E. S. Perrin. (*Meter and Instrument Section*).—Friday, December 2nd. Institution, London. 7 p.m. "The Technique of the High-Speed Cathode-Ray Oscillograph." Messrs. F. P. Burch and R. V. Whelpton. Saturday, December 3rd. Florence Restaurant, W. 7 p.m. Section dinner. (*Mersey and North Wales (Liverpool) Centre*).—Monday, December 5th. University, Liverpool. 7 p.m. "Electric Lighting of Buildings." Dr. J. W. T. Walsh and Mr. A. B. Read. (*South Midland Centre*).—Monday, December 5th. University, Birmingham. 7 p.m. "The Inland Telegraph Service—the Introduction of Modern Machinery and Methods." Mr. R. P. Smith. (*East Midland Sub-Centre*).—Tuesday, December 6th. University College, Nottingham. 6.45 p.m. "The Electric Lighting of Buildings." Messrs. A. B. Read and J. W. T. Walsh. (*North Midland Centre*).—Tuesday, December 6th. Hotel Metropole, Leeds. 7 p.m. "An Analysis of the Costs of Electricity Supply and its Application in relation to various types of Consumers." Messrs. E. H. E. Woodward and W. A. Carne. (*North-Western Students' Section*).—Tuesday, December 6th. Engineers' Club, Manchester. 7.15 p.m. "Instrument Transformers." Mr. S. Farrer. (*Wireless Section*).—Wednesday, December 7th. Institution, London. 6 p.m. "Some Characteristics of Short Wave Propagation." Prof. J. Hollingworth. (*Irish Centre, Dublin*).—Thursday, December 8th. Trinity College, Dublin. 7.45 p.m. "The Relative Fuel Economy of Electricity, Gas, Oil, and Solid Fuel as Heating Agents." Mr. A. H. Barker. (*Dundee Sub-Centre*).—Thursday, December 8th. University College, Dundee. 7.30 p.m. "Photo-electric Cells and Thyratrons." Mr. L. J. Davies. (*London Students' Section*).—Thursday, December 8th. 6 p.m. Visit to Broadcasting House, W. Friday, December 9th. Institution, London. 6.15 p.m. "Automobile Electrical Equipment." Mr. K. R. Sturley. (*North-Eastern Students' Section*).—Friday, December 9th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "Applications of Electricity on Ships." Mr. N. H. Denholm.

Nottingham Society of Engineers.—Monday, December 5th. Welbeck Hotel, Nottingham. 7.30 p.m. "Electric Traction." Mr. A. B. Washington. Friday, December 9th. 8 p.m. Annual dinner.

Electrical Association for Women.—Tuesday, December 6th. 3 p.m. Visit to the London showrooms of Messrs. Belling and Co., 313, Regent Street, W.

Bristol Association of Engineers.—Wednesday, December 7th. Royal Hotel, Bristol. 8.15 p.m. "The Impulse Turbine." Mr. G. T. Champion.

Institution of Heating and Ventilating Engineers.—Wednesday, December 7th. Home Office Industrial Museum, S.W. 7 p.m. "Examples of Modern Heating, Ventilating and Electrical Installations." Dr. Oscar Faber.

British Institute of Radiology (Rontgen Society).—December 7th-9th. Central Hall, Westminster. Radiological Exhibition. Friday, December 9th. Trocadero Restaurant, W. 7.15 for 7.30 p.m. Annual dinner.

Junior Institution of Engineers.—Friday, December 9th. Royal Society of Arts, Adelphi, W.C. 7.30 p.m. Inaugural meeting. Presidential address by Sir Alexander Gibb.

Association of Mining Electrical Engineers (North of England Branch).—Friday, December 9th. County Technical School, Workington. 7 p.m. Film illustrating "The Modern Electrified Colliery," followed by a short lecture by Mr. R. W. Mann.

Notes

Grid Tariff for Central Scotland

The Central Electricity Board will be giving preliminary notice this week to the authorised undertakers in the area of the Central Scotland Electricity Scheme that they will commence trading in that area on the terms of the Electricity (Supply) Act, 1926, on January 1st. The grid tariff for Central Scotland includes similar fixed kilowatt charges to those arranged for Mid-East England (see our last issue), but the variation in respect of rates is based upon 6s., as against 5s. 3d., consequent on the variation of circumstances in the area. The running charge will be 0.2d. per kWh with coal at 13s. 6d. per ton as against 0.186d. per kWh with coal at 13s. per ton in the Mid-East England.

Apart from these differences the Tariff for Central Scotland, the Explanatory Memorandum, the General Conditions, the Metering Memorandum, and the Form of Agreement for a direct supply at the tariff are the same as for mid-East England.

The Drumm Train

A sitting of the Railway Wages Board was held in Dublin on November 24th at which Mr. Morton, general manager of the Great Southern Railways Co., attended, and referred to the possibilities of the Drumm electric storage battery. He explained that a very eminent firm of electrical engineers had been employed by the Drumm Battery Co., with the consent of the Free State Government, to make an expert investigation into the working of the Drumm train, and to report whether it was a practical proposition. The railway company has incurred certain expenditure in providing charging stations, &c., but it is indemnified against loss by the Government. Mr. Morton added: "The actual working of the Drumm train is most promising. Certainly we are surprised at the success of the Drumm train. It has been running now for several months, doing about 300 miles per day."

The E.A.W.'s New Headquarters

The Electrical Association for Women announces that it has secured new premises at 20, Lower Regent Street, Piccadilly Circus, S.W.1. In addition to increased office accommodation, there will be a club room for members and an electrical housecraft school where lectures and demonstrations will be arranged. The headquarters staff will be in occupation at the end of December, and the premises will be open for inspection by members towards the end of January. Next year's annual conference is to be held at Birmingham from May 3rd to 5th.

Appointments Vacant

Assistant accountant for Winchester Electricity Department.
Shift charge engineer for Warrington Electricity Department.
Switchboard attendant for Scarborough Electricity Department. (See our advertisement pages to-day.)

Metallisation

At the Dudley works of Metallisation, Ltd., an interesting demonstration of a metal-spraying process was given before a large company of industrialists and metallurgists on Monday. The company's system enables aluminium, zinc, copper and other metals to be sprayed on to all kinds of surfaces by means of a special pistol. The pistol, which is small and easily manipulated, is fed from a coil of wire of the metal being sprayed, and is automatically pushed through the pistol by compressed air and projected in the form of the metal spray on to the substance required to be coated. Although the wire is melted in the pistol at a very high temperature the enveloping blast of compressed air and the speed at which the spray travels from the pistol have an almost instantaneous cooling effect, so that it is possible to hold the naked hand in the metal spray a few inches away from the pistol nozzle without discomfort. Its use is being developed in a variety of ways in the general engineering, gas and electrical, motor car, chemical and artificial silk industries.

Sir Martin Melvin, a director of Metallisation, Ltd., presided at lunch at the Grand Hotel, Birmingham, and Sir Gilbert Vyle, in proposing a vote of thanks to the company, expressed the opinion that metal spraying in the present form would render a national service in the prevention of waste by rust and corrosion.

An Electrical Engineer's Bravery

The King has awarded the Edward Medal to Mr. Osmond Williams in recognition of his gallantry in the following circumstances:—

On July 15th Mr. Williams, an electrical foreman in the Public Works Department, Sierra Leone, received a telephone message to the effect that a distribution wire had fallen in a street in Freetown and he immediately went to investigate. When he arrived at the spot he saw a woman approaching the broken wire and shouted to her to stop, but she continued on her way and became entangled in the wire. Mr. Williams immediately endeavoured to free the woman and, in spite of severe shocks, succeeded in doing so. He applied artificial respiration until the woman's breathing appeared to be normal, and then drove her to hospital. Afterwards he returned and superintended the repair of the broken wire. The woman subsequently died from the shock which she received. Mr. Williams was an experienced electrician and, in consequence, was fully aware of the danger which he incurred. At the time, his clothing was wet with rain which greatly increased his peril, and there can be no doubt that he knowingly risked his own life in going to the woman's rescue.

The Batti-Wallahs

At the monthly luncheon of the Batti-Wallahs' Society on Thursday last week the speaker was Mr. J. O. P. Bland, who briefly reviewed conditions in China and the Far Eastern situation. He was introduced by the president, Mr. Walter Riggs, who said that Mr. Bland had lived in China for over thirty years, and was therefore well qualified to speak on such matters. Mr. Bland dispelled a prevalent illusion that China was a country which possessed a vast potential purchasing power waiting only for cultivation. He pointed out that the population was poverty stricken and the country in a state of chaos. Only international intervention could restore order. A vote of thanks to the speaker was moved by Mr. G. W. Partridge and heartily accorded. Mr. M. Whitgift, the hon. secretary, mentioned that the annual dinner and dance of the Society was to be held on March 17th, and that the next luncheon would take place on December 15th, when Mr. W. B. Woodhouse would be the principal guest and would deliver an address on "The Electricity Supply Industry."

The South Scotland Grid

Considerable progress has been made on the South Scotland grid scheme. On the western side, the section from Glenlee to Tongland has been in use since the middle of October to give a temporary supply at 11 kV to the contractors who are building the power station at Tongland. Almost all the towers in this section have now been erected. On the eastern side, the section between Newcastle and Galashiels has been completed, including wiring, with the exception of a few towers which require special piling for the foundations by reason of the boggy nature of the ground. All the towers between Galashiels and Edinburgh have been erected with the exception of six which require special foundation work. The contractors are British Insulated Cables, Ltd.

The Institute of Physics

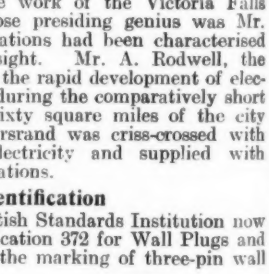
The inaugural meeting of a local section of the Institute of Physics was held at Manchester on November 18th. Twenty-eight members and visitors were present. This is the first local section to be formed in this country, but local sections have been in existence in Australia and India for some time. Prof. W. L. Bragg was elected chairman and Dr. H. Lowery local honorary secretary.

The South African I.E.E.

Tribute to the influence of electrical engineers in the industrial development of South Africa was paid by Mr. John Martin, president of the Chamber of Mines, at the recent annual dinner in Johannesburg of the South African Institute of Electrical Engineers. In proposing the toast of the Institute, Mr. Martin said it began twenty-three years ago with a membership of forty-one; it now had over 500 members and students, and had set qualification standards which invested corporate membership with a recognised status. Mr. Martin also acknowledged the valuable work of the Victoria Falls and Transvaal Power Co., whose presiding genius was Mr. Bernard Price, and whose operations had been characterised by notable efficiency and foresight. Mr. A. Rodwell, the chairman, in replying, said that the rapid development of electrical engineering had occurred during the comparatively short space of forty years. To-day sixty square miles of the city and the whole of the Witwatersrand was criss-crossed with lines for the distribution of electricity and supplied with energy from numerous power stations.

Polarity Identification

The sub-committee of the British Standards Institution now engaged in revising B.S. Specification 372 for Wall Plugs and Sockets has recommended that the marking of three-pin wall sockets conforming with that specification shall be as shown in the accompanying diagram, viewed from the front of the wall socket, E representing the earthing contact, L the contact for the live wire, and N the contact for the neutral wire. The recommendation for the marking of plug tops will correspond, and a similar principle is also applicable to the plugs and sockets covered by B.S. Specification No. 196. It has been deemed advisable to make this recommendation known as soon as possible in order that the above relative arrangement of the contacts may also be adopted when fixing and connecting up the wall plugs and sockets now available, the majority of which are unmarked in this respect.



Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

VICTORLIC oil-resisting rubber.
ECLIPSE cables.
Electrically heated blocking press as used for bookbinders.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. **John Taylor,** A.M.I.E.E., has been appointed mains technical assistant to Sheffield Corporation Electricity Department. He served his apprenticeship at Blackburn electricity undertaking and five years ago he became assistant mains engineer in the Walsall Corporation Electricity Department.

[*Lafayette*

Mr. P. Clegg

Mr. P. Clegg, B.Sc., A.M.I.E.E., engineer and manager of the Haslingden Corporation Electricity Department, has been selected from 252 applicants for the position of electrical engineer to the Morecambe and Heysham Corporation in succession to Mr. M. J. Mortimer, who was recently appointed borough electrical engineer at Loughborough. Mr. Clegg is a native of Rochdale, where he was successively switchboard attendant, sub-station engineer, and mains assistant. He was subsequently appointed electrical engineer and manager at Bingley where he remained for eight years, leaving there in August, 1931, to take up the position at Haslingden. Mr. Clegg is 36 years of age, and his commencing salary at Morecambe will be £500, rising by increments of £50 to £600 per annum.

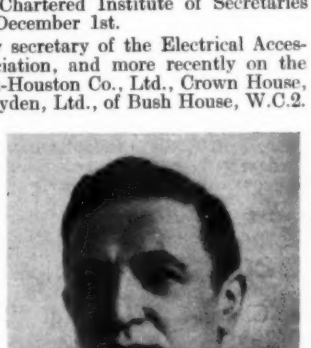
Mr. J. A. Prescott, of the staff of the switchgear design department of the English Electric Co., Ltd., Stafford, who was married on November 16 to Miss N. F. W. Slawson, was presented by his colleagues with an electric toaster.

Mr. Christopher Watkin has been elected chairman of the Committee to take the place of Ald. J. W. Longley, who recently took office as Lord Mayor of Bradford.

Mr. Howard Foulds, the secretary of Callender's Cable & Construction Co., Ltd., and allied companies, has been elected honorary treasurer of the Chartered Institute of Secretaries for the year commencing December 1st.

Mr. F. J. Collis, formerly secretary of the Electrical Accessories Manufacturers' Association, and more recently on the staff of the British Thomson-Houston Co., Ltd., Crown House, has joined Messrs. Lang Clayden, Ltd., of Bush House, W.C.2.

When the Hampshire Society of London held its annual dinner at the Hotel Metropole, London, the president, **Col. Sir Arthur Holbrook,** had with him his six sons and four daughters. The company included many distinguished guests, and among the representatives of the electrical industry were Mr. F. W. Purse, Mr. T. W. Ellis, Mr. Loveridge (chief engineer of Overhead, Ltd.), Mr. Montgomery (Alton Battery Co.), and their wives. Mr. F. J. Godden (of John Godden & Co., electrical engineers and factors), chairman of the Society for the past two years, was also present with a party.



[*Guttenberg, Manchester*

Mr. J. Webber, who is supervising the new London showrooms of the Provincial Incandescent Fittings Co., Ltd. He founded the company in Manchester thirty-two years ago

Mr. J. D. Parkinson, who was a student at Faraday House, London, and is now assistant distribution engineer with the China Light & Power Co., at Hong Kong, was married on November 11th at Union Church, Hong Kong, to Miss O. M. Jeffeison, of Keyingham Hall, Yorks.

Mr. T. Franklin Sibly, LL.D., D.Sc., vice-chancellor of the University of Reading, has been appointed a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

Mr. Bruce Thomas, K.C., has been appointed president of the Railway Rates Tribunal in succession to Sir Walter B. Clode, K.C., who has retired from that office. Mr. Thomas has had long experience at the Parliamentary Bar and has practised before the Railway Rates Tribunal and the Railway and Canal Commission.

Mr. F. M. Starr, of the central station engineering department of the General Electric Co., Schenectady, N.Y., has been awarded the Alfred Nobel prize for his paper "Equivalent Circuits," presented at the January convention of the American Institute of Electrical Engineers in New York City.

[*Killick & Abbot*

Mr. F. Lydall, who read his paper on "The Electrification of Suburban and Certain Main Line Sections of the Great Indian Peninsula Railway" before the North-Eastern Centre of the I.E.E. on Monday last

Mr. G. Harper, boiler house superintendent at the Metropolitan Railway Power Station, Neasden, has been appointed boiler house superintendent by the Croydon Corporation Electricity Committee at £487 per annum.

We regret to learn that **Mr. J. Rendell-Baker,** of the Liverpool Electric Cable Co., Ltd., and brother of Mr. F. N. Rendell-Baker, borough electrical engineer at Croydon, also his sister-in-law (Mrs. Rendell-Baker) and his chauffeur, were injured in a motor smash near Mytholmroyd, on November 24th. We are glad to hear that Mr. Rendell-Baker's injuries were not so serious as was at first thought. Mrs. Rendell-Baker, however, suffered more severely, and her recovery will be a matter of time.

Mr. G. Hedley Davis, assistant sales engineer in the Sheffield Electric Supply Department, has been appointed sales and installation engineer to Newport, Mon., Electricity Department. Previous to his service at Sheffield, Mr. Davis was for some years on the staff of the Birmingham Electric Supply Department, where he was assistant to the commercial and consumers' engineer.

Professor E. W. Marchant was presented with a radiogramophone at last Monday's dinner of the Mersey and North Wales (Liverpool) Centre of the I.E.E. as a mark of appreciation of his election to the presidency of the Institution.

Alderman W. Walker, of the Central Electricity Board, who is this year's Lord Mayor of Manchester, was entertained to dinner by the Manchester Engineers' Club last week. Mr. H. Richardson, the hon. secretary of the Club, has sent us a copy of a clever caricature which appeared on the menu, and this is reproduced herewith. Alderman Walker also received the congratulations of the District Joint Board and Joint Industrial Council for the Electricity Supply Industry at the annual conference of authorised undertakers in the North-Western Area on November 22nd, when he attended in his capacity of one of the employers' representatives.

Alderman Walker on the grid

Mr. G. Harper, boiler house superintendent at the Metropolitan Railway Power Station, Neasden, has been appointed boiler house superintendent by the Croydon Corporation Electricity Committee at a salary of £487 per annum.

Obituary

Sir James Marr, Bt.—The death occurred on November 24th, at Sunderland, at the age of 78 after a long illness, of Sir James Marr, Bt., who was a director of the Sunderland Forge & Engineering Co.

Mr. F. Imeson.—The death took place at Bedlington Station, Northumberland, on November 22nd, of Mr. Frank Imeson, chief electrician at Cowpen Colliery. Mr. Imeson was interested in safety methods at the colliery and was responsible for the introduction of a new system of shaft signalling, a controlling finger for an overhead trolley clutch, apparatus for testing trailing cables in the mines, and other devices.

Four Institution Functions

DURING the past week or ten days members of the Institution of Electrical Engineers in various parts of the country have gathered together at their Centres' annual dinners and many distinguished men have attended as guests. Some notes on these events appear below.

Birmingham

The annual dinner of the South Midland Centre of the Institution of Electrical Engineers held at Birmingham on November 25th, was presided over by Mr. J. Morton (Centre chairman). The arrangements were well carried out by Captain H. Hooper.

Mr. Neville Chamberlain (Chancellor of the Exchequer), in proposing the toast "The Institution of Electrical Engineers," said that he had no doubt that the 20 per cent. tariff had assisted the industry in the home market. The value of the electrical machinery imported in the first ten months of 1930 was £159,000; in 1931 it rose to £228,000, but this year it was only £45,000. The imports of all other electrical goods and appliances over a similar period in 1930 were valued at £5,770,000, in 1931 £4,687,000, and this year £2,187,000. The Ottawa agreements would help electrical industry in the export market. The establishment of tariffs on imports had given us a lever by which we might lower the tariff barriers against us. He was optimistic regarding the future of the electrical industry as it was really well organised, well equipped for research, and had a productive capacity that would enable it to take advantage of renewed trading opportunities.

In responding to the toast, Professor E. W. Marchant (President, I.E.E.), said that it was largely due to the influence of Mr. Joseph Chamberlain that Birmingham University received its Charter; that was followed by grants of charters to Manchester, Liverpool, and Leeds, and later to other universities in all parts of Great Britain. The principle of unification on which the grid had been based would ultimately be recognised as the soundest principle. Would electricity have been available in the remoter places if the grid had not been built? A further programme of electrification of "intermediate distribution" would not in itself be enough, for if consumers were to have the full benefit of electricity supply they must have the money to pay for installation; he hoped the Chancellor of the Exchequer would be able next April to reduce taxation for this purpose.

The Chairman gave the toast "Kindred Societies and Guests," and the Earl of Dudley, who responded, spoke of the debt everyone was under to the authorities who provided the benefits of electricity. He urged the use of more and more electricity, as the brighter the surroundings, the brighter would be the entire mental outlook.

Glasgow

The annual dinner of the Scottish Centre of the Institution of Electrical Engineers was held at Glasgow on Nov. 22, Mr. D. H. Bishop, city electrical engineer, Dundee, chairman of the Centre, presiding.

Proposing the toast of "The Institution," the Earl of Airlie said that the membership was now about 14,000. He was voicing their wishes when he said that they prayed for a speedy return to prosperity, not only to the electrical industry but to all industries. Prof. Marchant, president, who replied, said that the Scottish Centre had a feather in its cap, because the first section of the grid was a Scottish section. Electricity had created more employment than almost any other science.

Mr. D. Macfarlane MacLeod, Glasgow, proposed "Our Guests." He said Scotland was entitled to look to the future with optimism. They were at present witnesses of development on a large scale of their hydro-electrical resources, and it was for them to see that the development was placed first and foremost at the disposal of Scottish industry. He could conceive of nothing more likely to foster home industries than a cheap supply of electric power.

In a message to the gathering, Lord Provost Swan, Glasgow, referred to the late Lord Kelvin, who had occupied the presidential chair of the Institution, and also mentioned his distinguished assistant and successor, Professor Magnus Maclean. As a producer and supplier of electrical energy, said the Lord Provost, the Corporation had a very deep interest in the Institution, and he thought it might be claimed that Glasgow had done something in its day to promote investigation and research, and to contribute to the progress and advancement of electrical transmission and distribution. Prof. G. W. O. Howe, Glasgow University, proposed the toast of the chairman, and Mr. Bishop replied. Following the dinner there was dancing and cards.

Liverpool

The annual dinner of the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers was held at the Adelphi Hotel, Liverpool, on Monday last, under the chairmanship of Mr. A. Cecil Livesey. The number present was 146—a record attendance.

The toast of "The Institution" was proposed by the Lord Mayor of Liverpool, Councillor A. Gates, and was responded to by Professor E. W. Marchant, the president. "Our Visitors" was proposed by Mr. A. J. Pratt, and the Earl of Derby and Mr. F. J. Marquis replied. The toast of "The Electrical and Allied Industries" was proposed by Dr. H. J. W. Hetherington and responded to by Mr. J. S. Peck. Mr. P. M. Hogg, immediate past-chairman, proposed the health of the chairman, to which Mr. Livesey replied.

The London Students

The dance of the London Students' Section of the Institution of Electrical Engineers is always a most enjoyable function and obviously serves its primary purpose of providing an opportunity for the younger members of our profession to know each other as men as well as engineers. Last Tuesday's event at the Victoria Hall, W.C., went with a swing from start to finish. The number present was over 200, the highest yet recorded; among these we noticed some of the leading honorary officials of the Institutions of Civil and Mechanical Engineers—presenting a sidelight on another useful activity of our students in encouraging close association with kindred bodies. Messrs. H. Hinde (chairman), J. H. Marsh (vice-chairman and M.C.), and T. S. Smith, the organiser of the function, rendered services that has potentialities as valuable as those of the more technical side of their activities for the Institution.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

North Lincolnshire and Howdenshire Electricity Co., Ltd.—Registered as a public company November 22nd. Capital, £100,000 in £1 shares. Objects: To acquire and turn to account the undertaking under the North Lincolnshire and Howdenshire Electricity Special Order, 1932, and to carry on in the counties of Lincoln and York and elsewhere the business of an electricity and gas lighting and power supply company in all its branches. The directors are: R. Armitage, Farnley Hall, Leeds; Sir Robert G. Ellis, Bt., M.P., Netherside Hall, Skipton in Craven; W. B. Jones, Whirlow Brook, near Sheffield; W. A. Crowther, Edgerton Hill, Huddersfield (all directors of the Yorkshire Electric Power Company; W. B. Woodhouse, The Croft, Bramhope, near Leeds (engineer and manager of the Yorkshire Electric Power Co.). Registered office: 35, Park Place, Leeds.

C. O. Birtles, Ltd.—Private company. Registered November 22nd. Capital, £3,500 in £1 shares. Objects: To acquire the business of a wireless and electrical dealer heretofore carried on by C. O. Birtles at West Street and elsewhere in Sheffield. The directors are: C. O. Birtles (managing director), 264, Main Road, Darnall, Sheffield; F. Bramhall, 6, Canterbury Drive, Sheffield. Solicitor: R. B. Grayson, Sheffield.

International Broadcasting Co. (Ireland), Ltd.—Registered in Dublin on November 21st, with a nominal capital of £10,000 in £1 shares. Objects: To carry on the business of wireless, telegraph, telephonic and general engineers, &c. The subscribers (each with one share) are: P. B. Tierney and Eileen Perry, both of 15, Kildare Street, Dublin.

Horton Relays, Ltd.—Private company. Registered November 24th. Capital, £1,000 in £1 shares. Objects: To construct and maintain wireless signal stations, and to carry on the business of consulting wireless experts, manufacturers of and dealers in wireless, electrical, radio and telephone appliances, &c. The directors are: W. Hallows, Hawthorne Cottage, Little Lever, and two others.

Philco Radio & Television Corporation of the Irish Free State, Ltd.—Private company. Registered in Dublin on November 25th. Capital £200 in £1 shares. Objects: To acquire and use the registered trade mark "Philco," and to carry on in the Irish Free State or elsewhere the business of manufacturers, constructors or assemblers of and dealers in radio products and apparatus, &c. The directors are: H. W. McAteer, Grosvenor House, London, and three others.

Drumkeeran Electricity Supply Co., Ltd.—Private company. Registered in Dublin on November 25th. Capital £700 in £1 shares. Objects: To carry on the business of an electric light company in all its branches. The directors are: T. Kelly, Drumkeeran, Co. Leitrim, and four others.

Master Neon Sign (Parent) Co., Ltd.—Private company. Registered November 28th. Capital £100 in £1 shares. Objects: To adopt an agreement with F. H. Wingrave, and to carry on the business of designers and manufacturers of electrical lamps and signs, electricians, electrical and mechanical engineers, designers of advertisements, &c. The subscribers are: F. H. Wingrave, Boundary Hall, Potters Bar; and W. Mitchell, 24, Twyford Road, Ilford. Solicitors: Ashurst, Morris, Crisp & Co., 17, Throgmorton Avenue, E.C.

E. M. F. Electric Co., Pty.—Additional particulars were filed on November 19th. The capital is £12,000 in £1 shares. The company was incorporated in Victoria, Australia, on May 3rd, 1923, to acquire the business carried on at South Yarra, Victoria, as the E. M. F. Electric Co., to adopt an agreement with E. J. Keogh, R. J. Frost, and G. A. Whiting, and to carry on the

business of engineers, founders, manufacturers of and dealers in electrical and other equipment, &c. Registered office: 269, Toorak Road, South Yarra. British address: South Africa Pavilion, Wembley, where A. R. Moon is authorised to accept service of process and notices on behalf of the company. Directors: J. E. Carroll, C. A. Holmes and J. T. Edmunds, all of Melbourne; R. A. Holland, North Carlton, Victoria; and G. A. Whiting, Hawthorn, Victoria.

Electricity Supply Development Co., Ltd.—Private company. Registered November 25th, with a nominal capital of £11,000 in 10,000 6 per cent. non-cumulative preference shares of £1 and 20,000 ordinary shares of 1s. each. Objects: To carry on the business of a light and power company, and that of electrical engineers, manufacturers and maintainers of plant for the generation, accumulation, transmission, and supply of electrical energy, &c. The subscribers are: E. R. Mabbitt, 46, Cavendish Drive, Leytonstone, and T. W. Riding, 40, Devereux Road, Wandsworth Common, S.W.11. Registered office: 32, Victoria Street, S.W.1.

Returns of Electrical Companies

Basingstoke Wire Broadcasting Service, Ltd.—Satisfaction in full on November 15th, 1932, of debentures authorised May 25th, 1932, and registered June 10th, 1932. (According to the register of mortgages, the debentures registered June 10th, 1932, originally secured £500.)

Particulars filed of £1,000 mortgage debentures authorised November 15th, 1932, charged on the company's undertaking and property, including any uncalled capital, the amount of the present issue being £800.

General Cable Manufacturing Co., Ltd.—Satisfaction to the extent of £962 10s., on October 15th, 1932, of debentures authorised November 2nd, 1931, and registered November 16th, 1931.

Wireless Services, Ltd.—Issue on October 3rd, 1932, of £100 debentures, part of a series already registered.

Eltons Radio, Ltd.—Debenture dated November 12th, 1932, to secure £250, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: H. Elliott, 29, Benton Road, Birmingham.

Broadcast Relay Service, Ltd.—Particulars filed of debentures for £50,000 and bonus of 5 per cent. authorised November 9th, 1932, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £15,000.

Ever Ready Co. (Great Britain), Ltd.—Capital, £1,000,000 in 200,000 preference shares of £1 and 3,200,000 ordinary shares of 5s. each. Return dated June 15th, 1932. 200,000 preference and 2,171,200 ordinary shares taken up. £280,000 paid on 98,000 preference and 728,000 ordinary shares, £462,800 considered as paid on the remainder. Mortgages and charges, nil. A further 434,240 ordinary shares were allotted for cash in June, 1932.

Merton, Blake & Co., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1931 (filed August 27th, 1932). All shares taken up. £100 paid. Mortgages and charges, nil.

J. S. Ramsbottom & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated June 16th, 1932. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Yorkshire Traction Co., Ltd.—Capital, £200,000 in 50,000 preference and 150,000 ordinary shares of £1 each. Return dated May 6th, 1932. 24,350 preference and 150,000 ordinary shares taken up. £148,315 paid on 22,350 preference and 125,965 ordinary shares, £26,035 considered as paid on 2,000 preference and £24,035 ordinary shares. Mortgages and charges: £20,301 13s., and £29,000 second debentures issued to bankers as collateral security.

Birkdale District Electric Supply Co., Ltd.—Capital, £50,000 in £5 shares. Return dated May 12th, 1932. 9,200 shares taken up. £46,000 paid. Mortgages and charges, £25,000.

Caxton Electric Developments, Ltd.—Capital, £300,000 in £10 shares. Return dated June 10th, 1932. 20,000 shares taken up. £70 paid, £199,930 considered as paid. Mortgages and charges: £200,000.

Phillips & Dart, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated November 8th, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £2,500.

Electrical Name and Numerical Sign Co., Ltd.—E. G. F. Cartwright, 21, York Buildings, Adelphi, W.C.2, ceased to act as receiver and manager on November 17th.

Uxbridge and District Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £150,000 in £1 ordinary shares beyond the registered capital of £450,000.

North Eastern Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £660,000 in £1 ordinary shares beyond the registered capital of £8,100,000.

Ensign Lamps, Ltd.—The nominal capital has been increased by the addition of £3,000 in £1 ordinary shares beyond the registered capital of £15,000.

Ellis & Mort, Ltd.—The nominal capital has been increased by the addition of £8,000 in £1 ordinary shares beyond the registered capital of £12,000.

City Notes

Amalgamated Wireless (Australasia), Ltd., reports that for the year to June 30th there was a net profit of £77,159, an increase of £17,963 as compared with last year. A dividend of 7½ per cent. is being paid, against 6 per cent., and £20,000 is transferred to general reserve, leaving a balance of £206,737. The total revenue was £465,122, compared with £421,920. The directors state that the increased profits were largely due to improved business in the beam wireless service and in manufacturing. The radio-telephone services operated by the company in conjunction with the Post Office were further extended, and the telephone networks in the eastern states of Australia can now be connected through the company's system with subscribers in nearly all European countries, the United States, Canada, many parts of South America, and Java and New Zealand. The service has also been extended to connect with a number of the principal Atlantic liners fitted with wireless telephone installations. Negotiations have been concluded for the manufacture of radio valves in Australia under the company's management.

Crompton Parkinson, Ltd., report a profit for the year ended September 30th last of £96,309, as compared with £100,021 for the preceding fifteen months. The directors have recommended a final dividend of 12½ per cent. actual on the ordinary and "A" ordinary shares, making 22½ per cent. for the year (against 30 per cent. for 15 months), and the transfer of £15,000 to reserve, leaving £52,049 to be carried forward against £46,922 (net) brought in.

The Anglo-Portuguese Telephone Co., Ltd., has given notice of its intention to redeem the seven per cent. first mortgage debenture stock on June 1st, 1933, at 102. A total of £112,205 of stock is outstanding. The company has created £400,000 5½ per cent. first debenture stock, of which sufficient is now to be issued to provide for the conversion of the outstanding seven per cent. stock. Alternatives to repayment in cash are: (1) For £100 of seven per cent. stock, £100 of 5½ per cent. stock, plus £4 cash in satisfaction of the redemption premium on existing stock, and discount in price of new stock; (2) for every £96 nominal of seven per cent. stock, £100 nominal of 5½ per cent. stock.

The Electric Supply Corporation, Ltd., held an extraordinary general meeting on November 25th at which a resolution to increase the capital by the creation of 250,000 shares of £1 each was approved. Mr. J. G. B. Stone (chairman) said that it was not intended to issue the whole of the new capital at present, but £50,000 of it would be offered to shareholders within the next few days.

John I. Thornycroft & Co. report a net loss of £177,600 for the year ended July 31st, as compared with a profit of £4,850 for 1930-31. A sum of £130,000 is transferred from reserve, and £52,108 is brought in, making £182,108, and, after deducting the loss for the year, a balance of £4,569 is carried forward.

Measurement, Ltd.—A petition for the confirmation of the reduction of the company's capital from £200,000 to £155,502 has been presented to the High Court, and will be heard in London on December 6th.

The Globe Telegraph & Trust Co., Ltd., has announced a quarterly dividend of 3s. per share, less tax, on the preference capital, and 1s. per share net on the ordinary shares of £10 (against nil).

The Shropshire, Worcestershire & Staffordshire Electric Power Co. has declared an interim dividend on the "A" ordinary shares of 4 per cent., less tax.

The British Columbia Power Corporation has announced a dividend of 50 cents per share on the class "A" shares for the period to December 31st.

The Manx Electric Railway Co., Ltd., reports a profit for the year ended September 30th of £4,359, as compared with £2,887 in the preceding year. A debit balance of £5,555 is brought in, and after providing for debenture interest, a debit balance of £9,431 is carried forward.

The Bengal Telephone Corporation reports a net profit for the year ended June 30th of Rs. 6,31,435 (against Rs. 5,94,846), to which is added Rs. 76,904 brought in. A dividend of 6 per cent., tax free (same), is paid on the ordinary shares and Rs. 1,30,912 is carried forward.

The Burma Electric Supply Co., Ltd., reports a net profit for the year ended July 31st last of £6,956, as compared with £12,034 in 1930-31, plus £7,917 brought in. The preference dividends are paid and £7,673 is carried forward. For the preceding year an ordinary dividend of 4 per cent. was paid.

The Electric Construction Co., Ltd., has decided to defer consideration of payment of a dividend on the 7 per cent. cumulative preference shares until after the close of its financial year on March 31st next.

The Chloride Electrical Storage Co., Ltd., has declared an interim dividend on the "A" and "B" ordinary shares of 6 per cent., actual, less tax (against 5 per cent., tax free).

The Rhenish-Westphalian Electricity Works reports gross profits for the past year of £3,302,000 and net profits of £538,500. The dividend on the share capital is maintained at 5 per cent.

Stocks and Shares

TUESDAY EVENING.

MARKETS unhappily continue to be dominated by the American debt controversy and, as mentioned in this column last week, no improvement can be hoped for until this matter has been settled. As a consequence business all round has diminished considerably; the pound sterling has dropped to its, as yet, lowest, and *per contra* the sterling price of gold has touched its highest on record. The gilt-edged market has naturally receded still farther, being also troubled by the 5½ per cent. call due on Thursday on the new 3 per cent. Conversion Loan. The impossibility of assessing the ultimate effects of the decisions which will have to be made by the Cabinet during the next few days is the reason for the uncertain state of affairs existing in industrial markets generally, for whereas one class of thinker foreshadows a mild dose of inflation with a subsequent improvement in the price of equities, the other side of the picture is a loss of gold spelling further deflation and a further reduction in international trade with its consequent adverse effect upon our own industries. You pay your money and take your choice, as it were! It is all very disturbing for the average investor, the wise ones

among whom continue to restrict their attentions exclusively to stocks of the safety first variety. Although business tended to slow down somewhat, the electric supply market was still very fortunate inasmuch as prices have with one or two minor exceptions maintained themselves at their previous week's levels, as will be seen from our list of prices. North Eastern Electric new ordinary, nothing paid, at around 1s. 9d. premium provided the most active spot, many deals taking place daily. The effect on the old ordinary, however, was to knock the price down a little farther to 26s. 6d. The new shares do not participate in any final dividend for the year, but as this not much more than pays for the full stamp and fee and commission on a purchase of the old shares, the new at, say, 25s. 6d. fully paid all in are appreciably the cheaper to buy of the two. The market considers North-Eastern at the present price one of the most attractive purchases in this section.

The Electric Supply Corporation Issue

The sanction by the shareholders of the creation of 250,000 ordinary shares of the Electric Supply Corporation has resulted in an offer of 50,000 shares to the existing ordinary shareholders at 51s. 6d. There are no specific rights to the issue, holders having the right to apply for as many as they like. The shares will rank in every respect equally with the old, even to the extent of participating in the final dividend for the current year. The issue is something of an "Irishman's" bonus, however, as the price of the old shares dropped a full 2s. 6d. to 53s. 6d. upon the issue being announced. With the exception of the above, points of interest have been conspicuous by their absence. There has, of course, been the usual day to day business in the principal bulk supply companies, but calling forth nothing worthy of comment. The companies supplying the Metropolis also continued firm with the exception of Metropolitan Electrics, which on one or two selling orders developed a weak tendency, dropping to 46s. The recently placed line of Hendons have now found permanent homes and the price has risen to just over 86s. West Gloucestershire Power tended to harden, particularly the ordinary which marked 53¾, and British Power & Light also continued in lock-up investment demand between 15s. 6d. and 15s. 9d. The prior charges of the whole group were quiet, which was not unnatural under prevailing circumstances. Of the companies operating abroad, British Columbia Power "A" stock saw a little investment demand at about 24 on the maintenance of the usual $1¼ quarterly dividend, but Shawinigan Power common were distinctly flat, marking under 14. This is against 30 as recently as September last. There was no alteration in the quotation of Burma Electric preference on the passing of the ordinary share dividend, which was not unexpected.

The London Passenger Transport Bill

The various securities affected by the London Passenger Transport Bill were very inactive in spite of the fact that the Bill will enter the committee stage of the House of Commons this week—and with it are promised some 250 amendments! Of the tramway companies the only movements were a rise of a couple of points in Metropolitan Electric Trams 4½ per cent. and 5 per cent. debenture stocks at 95 and 96 respectively. That there is scope for talent in some of these stocks will be seen when it is mentioned that, whereas Metropolitan Electric Trams 5 per cent. debenture is 96, London General Omnibus 5 per cent. cumulative income stock is 111, yet if the Bill goes through they are both exchanged at par for the 5 per cent. "B" stock of the Passenger Transport Board. Both Metropolitan Railway ordinary and Metropolitan District ordinary moved in favour of holders, Metropolitans improving 3 points to 63 and Districts showing a 1 point rise at 67½. Undergrounds were again contrary to the general rule, being barely 19s. There was a little spurt of activity in Lancashire United Transport ordinary on the possibility of a maiden dividend being announced in the report due in February, the shares marking as high as 9s. 6d. The 5 per cent. second debenture stock of this company, redeemable in 1956 at 100, was also active at just under par. As the stock carries a full year's interest payable in February next, buyers to-day receive altogether £20 gross income before their capital is repaid 34 years hence, a yield of just over 6½ per cent. per annum. The securities of the Anglo-Argentine Tramways Company remained in the doldrums, but Calcutta Tramways ordinary are continuing their slow upward climb marking 19s. and over as a result of the continued excellent traffics.

Equipment Shares

In the manufacturing section the securities of the Crompton Parkinson Company brightened up perceptibly on the report which, under ruling conditions, was considered excellent showing. Aron Electricity Meter ordinary were also a good market jumping to 28s. 3d. The decision of the board of the Electric Construction Company to defer consideration of payment of the preference dividend until the accounts for the current year are out in the spring had no effect on current quotations, as it was not unexpected. Both Associated Electrical Industries and General Electrics were very inactive during the whole week, and the general tendency of the cable-makers was downwards, British Insulated, Callenders, and Henleys, all losing the "turn." The same can be said of the cables and wireless combine, for whereas the "B" stock maintained its previous level, both the "A" and the 5½ per cent. preference shed a little at 29 and 78½ respectively.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Nov. 22	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/–	—	4 5 9
Brompton Ordinary	1	8½	8½	33/–	—	4 4 10
Central Electricity 4½% Deb.	Stock	4½	4½	104½	—	4 6 2
Charing Cross Ordinary	1	8¼	8¼	33/6	—	4 3 7
Chelsea	1	8¼	8¼	33/6	—	4 3 7
City of London	1	10	10	45/6	—	4 7 11
Clyde Valley	1	8	7	32/–	—	4 7 9
County of London	1	11	10½	50/6	—	4 3 2
Edmundsons' 7% Pref.	1	7	7	30/–	—	4 13 4
Elec. Dis. Yorkshire	1	9	9	41/3	—	4 7 4
Elec. Supply Corporation	1	11	11	53/6	–1/6	4 2 3
Kensington Ordinary	1	8	8	33/6	—	4 3 7
Lancs. Light and Power	1	6½	7	29/3	—	4 15 9
London & Home Counties 4½% Deb.	Stock	4½	4½	107	—	4 4 0
London Electric	1	9	9	33/6	—	4 3 0
Metropolitan	1	10	10	46/–	–1/–	4 7 0
Midland Counties	1	7	7	33/9	—	4 3 0
Mid. Elec. Power	1	8	8	35/9	—	4 9 5
North Eastern Electric Ordinary	1	6	6	26/6xR	–6d.	4 10 7
Do. 7% Pref.	1	7	7	31/6	—	4 9 0
Northampton	1	10	10	48/–	—	4 3 4
Notting Hill 6% Pref.	10	6	6	12½	—	4 16 0
North Met. Elec. 6% Pref.	1	6	6	29/6	—	4 1 4
St. James' and Pall Mall	1	8	8	33/6	—	4 3 7
Scottish Power	1	8	8	33/9	—	4 14 10
South London	1	8½	8½	33/–	—	4 4 10
Urban Ordinary	1	7	7	33/9	—	4 3 3
Westminster Ordinary	1	8½	8½	33/–	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 6
Yorkshire Elec.	1	8	8	39/–	—	4 2 0
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	82½	—	4 17 0
Metropolitan	„	3½	2½	63	+3	3 19 4
Do. District	„	5	4½	67½	+1	6 13 4
Underground Electric	1	8	7	19/–	—	7 7 4
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	162½	—	5 10 9
Anglo-Am. Tel. Pref.	Stock	6	6	105½	—	5 13 9
Do. Def.	„	1½	1½	26	—	5 15 5
Cables & Wireless 5½% Pref.	„	5½	2¾	78½	–1	3 10 1
Do. A 7½% Ord.	„	—	Nil	29	–½	—
Do. B Ord.	„	—	Nil	13	—	—
Globe Tel. and T. Ord.	10	8½	Nil	11½	–¼	—
Do. do. Pref.	10	6	6	11¾	—	5 2 2
Great Northern Tel.	10	20	20	28	—	7 2 10
Marconi-Marine	1	15	10	33/9	—	5 18 6
Oriental Telephone Ord.	1	12	12	3	+1/8	*4 0 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	5/–	—	—
Do. do. 2nd Pref.	5	—	—	3/9	+1/3	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	„	5	5	300	—	—
Do. do. Pref. Ord.	„	8	8	132½xd.	–3	6 0 9
Brazil Traction	100	—	—	13	—	—
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	101½	—	4 18 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	12/–	—	—
London United Tram Deb.	Stock	4	4	67½	—	5 19 5
Mexico Trams, 5% Bonds	—	5	5	45	—	11 2 2
Mexican Light Common	100	Nil	Nil	10	–2½	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	69½	—	7 11 10
Victoria Falls Ord.	1	15	15	77/–	–1/–	3 18 0
Yorkshire (West Riding)	1	Nil	Nil	5/–	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	17/6	—	4 11 5
Do. Pref.	1	8	8	30/–	—	5 6 8
Babcock & Wilcox	1	14	14	37/6	—	—
British Aluminium Ord.	1	10	5	25/–	—	4 0 0
British Insulated Ord.	1	15	15	66/3	–2/6	4 10 8
Brush Ord.	Stock	5	Nil	40	+5	—
Callender's	1	15	15	3⅛	–¼	4 18 0
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 6
Crompton Parkinson Ord.	5/–	30	24	21/3	—	5 13 0
Do. 8% Pref.	1	8	8	30/–	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	24/3	—	6 3 8
Do. 5% Deb.	Stock	5	5	100	—	5 0 0
Electric Construction	1	Nil	Nil	8/9	—	—
Enfield Cable Ord.	1	25	25	4⅞	—	5 12 7
English Electric	1	Nil	Nil	10/–	—	—
Do. do. Pref.	1	Nil	Nil	14/–	—	—
Ever Ready	5/–	35	35	28/–xd.	–1/–	6 1 5
Ferranti Pref.	1	7	7	23/6	—	5 19 2
G.E.C. Pref.	1	6½	6½	29/6	—	4 8 2
Do. ord.	1	10	8	40/–	—9d.	4 0 0
Henley's	1	30	30	6½xd.	–¼	4 19 0
Do. 4½ Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	3/9	+1/9	—
Johnson & Phillips	1	10	5	1	—	5 0 0
Siemens Ord.	1	7½	7½	25/9	—	5 6 6
Telegraph Construction	12	Nil	Nil	10½	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

7058. "Electric discharge tubes." Boonton Research Corporation. March 19th, 1930. (382945.)

14046. "Automatic regulators for dynamo-electric machines." British Thomson-Houston Co., Ltd. May 12th, 1930. (382949.)

16213. "Multiple ratio transformers." F. W. Lanchester. June 4th, 1931. (382952.)

22404. "Automatic telephone systems." Siemens Bros. & Co., Ltd., W. H. Grinsted, and W. G. Patterson. August 7th, 1931. (382964.)

22690. "Mounting arrangements for telephone and like apparatus." Siemens Bros. & Co., Ltd., and E. A. Petithory. August 11th, 1931. (382968.)

22935. "Electric switches operated by the movement of part of a machine." J. Hetherington & Sons, Ltd., and S. Bury. August 14th, 1931. (382970.)

25648. "Permanent magnets." Darwins, Ltd., W. H. Charlton, and W. Brown. August 22nd, 1931. (Cognate application 27477/31.) (382975.)

24349. "Resonance relay operating according to the Ferraris principle." Landis & Gyr Soc. Anon. September 2nd, 1930. (382981.)

24380. "Electrostatic fixed condenser." A. C. Ducati. August 29th, 1931. (Convention date not granted.) (382982.)

26086. "Vacuum electric discharge tubes." N. R. Davis C. R. Burch, J. H. Ludlow, and Associated Electrical Industries, Ltd. September 17th, 1931. (382996.)

27425. "Electric lifts." W. Wood and W. Wadsworth & Sons, Ltd. October 2nd, 1931. (383004.)

28400. "Thermally operated electrical instruments." Electrical Improvements, Ltd., and H. B. Poynder. October 13th, 1931. (383017.)

29477. "Electrically insulating bushings." International General Electric Co., Inc. October 23rd, 1930. (383034.)

29752. "Portable electric battery lamps." H. F. Joel. October 27th, 1931. (383037.)

30594. "Electric dry batteries." A. P. Welch. November 4th, 1931. (383052.)

31143. "Arrangement in electric induction furnaces without a closed ferro-magnetic circuit." Allmanna Svenska Elektriska Aktiebolaget. August 29th, 1931. (383058.)

31168. "Radio course finding systems for aircraft." British Thomson-Houston Co., Ltd. November 21st, 1930. (383059.)

31578. "Resistance elements for use in variable electric resistance devices." Gramophone Co., Ltd., F. B. Sargent, and T. C. Finnimore. November 14th, 1931. (383063.)

31887. "Electric switches the contacts of which are opened under a switch liquid acting electrolytically." Siemens-Schuckertwerke Akt.-Ges. December 4th, 1930. (383065.)

32443. "Manufacture of electric condensers." Naamlooze Vennootschap Philips Gloeilampenfabrieken. February 11th, 1931. (383073.)

32996. "Disc shaped piezo-electric oscillators (or resonators)." H. Straubel. December 2nd, 1930. (383075.)

33301. "Thermionic valve circuits." General Electric Co., Ltd., and R. C. Walker. December 1st, 1931. (383077.)

35929. "Permanent magnets for loud speakers or the like." A. Cole. December 30th, 1931. (383099.)

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1610. "Regulating devices comprising triodes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. February 2nd. 1931. (383110.)

3514. "Electric condensers and methods of manufacturing the same." International General Electric Co., Inc. February 5th 1931. (383122.)

4308. "Arc extinguishing means for high potential electric switches." E. Lange. February 16th, 1931. (383127.)

5536. "Arrangements for the charging of electric batteries." Siemens & Halske Akt.-Ges. February 24th, 1931. (383132.)

5575. "Thermionic valves or electron discharge tubes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. May 20th. 1931. (383133.)

6837. "Shells for electromagnetic coils." W. J. Tennant (Rola Co.). March 7th, 1932. (383140.)

7514. "Directional reflectors for lamps for street lighting." C. H. A. Kempton. March 14th, 1932. (383145.)

9152. "Cleaning and degassing of electric discharge tubes." British Thomson-Houston Co., Ltd. (Dr. E. Germer). March 30th, 1932. (383156.)

9184. "Tumbler switch for electrical installations." P. Hochkopper, O. Winkel, and E. Assmann. August 12th, 1931. (383157.)

9798. "Electric lamps." General Electric Co., Ltd. May 7th, 1931. (383165.)

9884. "Dial switches." H. Fuld & Co. Telephon-und Telegraphenwerke Akt.-Ges. April 13th, 1931. (383166.)

11387. "Electrical high-frequency oscillators." Marconi's Wireless Telegraph Co., Ltd. May 27th, 1931. (383180.)

12577. "Remote control system for radio receivers." E. C. Axe (A. S. Blatterman). May 2nd, 1932. (383189.)

12825. "Electric lamp reflectors." W. Johns. May 4th, 1932. (383194.)

13300. "Electric steam boilers." Sulzer Freres Soc. Anon. June 29th, 1931. (383196.)

13444. "Transformers." Naamlooze Vennootschap Philips Gloeilampenfabrieken. May 16th, 1931. (383197.)

13488. "Magneto-electric apparatus for exploding mines." K. Schaffler-Glossl. May 10th, 1932. (383198.)

13611. "Arrangement of drying animal, vegetable, and mineral raw materials using electro-osmose and mechanical pressure." K. K. Fjell. May 11th, 1932. (383199.)

13922. "Electric accumulators." Chloride Electric Storage Co., Ltd. (W. H. Crietz). May 14th, 1932. (383201.)

15544. "Illuminating arrangement for motor vehicles." A. Ehlert. June 1st, 1931. (383211.)

16942. "Electric motor control systems." British Thomson-Houston Co., Ltd. June 15th, 1931. (383215.)

18237. "Electrolytic condensers." Magnavox Co. February 23rd, 1932. (383225.)

18468. "Permanent magnets." Darwins, Ltd., and C. W. Collins. June 30th, 1932. (383227.)

19616. "Telegraph systems, more particularly wireless telegraph systems." Siemens & Halske Akt.-Ges. July 11th, 1931. (383236.)

20096. "Loudspeakers." International General Electric Co., Inc. July 15th, 1931. (383239.)

22287. "Device for improving the load curve of induction measuring apparatus." Landis & Gyr Akt.-Ges. August 14th, 1931. (383246.)

26416. "Electrical roll housings for rolling small sections." W. W. Triggs (Schloemann Akt.-Ges.). November 2nd, 1931. (Divided application on 30354/31.) (383253.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 23rd:—

Air-Way. No. 532772. Class 6. Air compressors, agitators, &c., for attachment to vacuum cleaning machines and other like appliances.—Air-Way Electric Appliance Corporation, Toledo, O., U.S.A. (British representatives: D. Young & Co., 11-12, Southampton Buildings, Chancery Lane, W.C.2.)

Supremus. No. 534287. Class 8. Low-tension battery or accumulator chargers, high-tension battery eliminators, and current rectifier units.—Supremus Specialities, Ltd., 118, High Street, Erdington, Birmingham.

Tiger. No. 535736. Class 8. Electric dry batteries (not for medical purposes), electric fixed condensers, grid leaks and resistances.—Hellesens, Ltd., Morden Road, South Wimbledon.

Ossicaide (lettering and design). No. 533323. Class 11. Electric aids for the deaf.—V. A. Foot, trading as "Ossicaide," 447, Oxford Street, W.1.

Elpec. No. 527271. Class 13. Electric lighting fittings, &c.—Lloyd Pascal & Co., 71-74, Ford Street, Hockley, Birmingham.

Insular. No. 533218. Class 13. Electric lamps (ordinary).—Insular Electric Glowlamp Works, Ltd., New Cleveland Street, Hull.

Pensulate. No. 536057. Class 50. Electrical insulating compounds made of bitumen, petroleum jelly, waxes, resins, mica, asbestos, or vegetable fibre, or of compounds of these substances.—Blackall Bros., Ltd., 1-3, Short Road, Stratford Market, E.15.

Italy's Foreign Electrical Trade

THE following statement showing Italy's imports and exports of electrical goods during 1931 has been compiled from the recently issued official trade statistics. Increases or decreases as compared with the previous year have been added.

In 1930 the weight of generators and motors imported was rather more than that of similar machinery exported, but last year exports were 5,800 quintals greater than imports. It is also noteworthy that last year imports of radio apparatus, at 10,100 quintals, were 6,300 quintals below those in the previous year; exports of these goods were in 1931 only about one-tenth the volume of imports, although showing a 50 per cent. increase for which larger shipments of electric cables and static transformers were primarily responsible.

Imports

	1931. Quintals.	Inc. or dec. as compared with 1930. Quintals.
Electric generators and motors	14,300	— 12,400
Static transformers	2,300	— 3,100
Electricity meters	870	— 730
Ammeters and other electrical instruments...	230	— 70
Telegraph and telephone apparatus—		
Wireless	10,100	— 6,300
Other	5,500	— 900
Carbons, electric	19,500	— 4,500
Insulators, porcelain, etc. ...	590	— 810
Accumulators	3,900	—
Magnetos	460	— 220
Other electrical apparatus and parts	13,400	— 6,100
Electric lamps (thousands) ...	5,450	— 5,950
Insulated electric wire or cable, covered with rubber or textiles	2,450	+ 750
Ditto, armoured, including submarine cables	2,780	+ 480

Exports

	1931. Quintals.	Inc. or dec. as compared with 1930. Quintals.
Insulated electric wire or cable, covered with rubber or textiles	15,810	+ 8,310
Ditto, armoured, including submarine cables	40,820	+ 19,820
Electric generators and motors	20,100	— 5,800
Static transformers	10,000	+ 16,300
Accumulators	3,150	+ 450
Magnetos	50	— 45
Electricity meters	340	+ 50
Telegraph and telephone apparatus	450	+ 100
Radio apparatus	1,120	+ 400
Insulators, porcelain, etc. ...	3,400	+ 900
Lamps (thousands)	1,954	— 1,070

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberystwyth.—Municipal pavilion (£18,000); L. G. Mouchel & Partners, architects, Victoria Street, S.W.1.

Bideford.—Hospital (£16,000) for Joint Hospital Board; Building & Public Works Construction Co., Ltd., Swindon.

Birkenhead.—Extensions to St. Hugh's Catholic Central School; trustees. School; Rev. Canon Tallon, 33, St. Mary's Street.

Birmingham.—Factory premises, Weston Lane, Acocks Green; E. G. Brown & Sons, builders, Yardley Fields Road, Stetchford. Motor showrooms, Broad Street, for Patrick Motors, Ltd.; J. Bowen & Sons, builders, Balsall Heath. Sewage works, Shirley; Tame & Rea District Drainage Board, 115-117, Colmore Row.

Bishopswearmouth (SUNDERLAND).—Restoration of parish church (£30,000); Thompson & Sons, builders, Peterborough.

Blackpool.—Hospital, Whinney Heys; Board of Management, Victoria Hospital.

Bobbing (KENT).—Estate development, Keycol Hill; Hedley Peters & Son, Sittingbourne.

Bradford.—Extensions for the Bradford Casing and By-Products, Ltd.; W. E. Bickers, architect, Sunbridge Road.

Broadwey (DORSET).—Reynolds Memorial Institute; S. A. Jackson, architect, National Provincial Bank Chambers, Dorchester.

Burton-on-Trent.—Reconstruction of the Wheatsheaf Hotel, Station Street and High Street; Forshaw & Palmer, architects, 9, Market Place.

Cardiff.—Houses (66), Council Estate; C. Brown & Co.

Carlisle.—Extensions to Cumberland Infirmary; committee of management.

Cheam (SURREY).—Church, By-pass Road; S. Richards, Chavuma, Palmer Avenue.

Chelmsford.—Completion of new County Hall (£21,745); contractors, T. J. Bailey & Son, Chelmsford.

Cheshire.—Mental colony, Cranage Hall (£101,327); county architect.

Chester.—School, Cliveden Road, for City E.C.; J. H. Dickson, clerk.

Coulsdon.—Ten shops, Stoats Nest Road; Stanford & Co.

Dover.—Houses (94), St. Radigund's Road Estate; borough engineer.

Droitwich (WORCS).—Cinema, Everton & Dowell.

Dudley.—Church, Priory Housing Estate, for Methodist Trustees; secretary.

Durham.—Casual ward improvements, Barnard Castle, Bishop Auckland and Easington (£13,000); county architect. Hospital, School Aycliffe (£120,000), for the C.C.; Rees & Holt, architects, 64, Rodney Street, Liverpool.

East Horsley (SURREY).—Estate development; Horsley Estates, Ltd.

Edinburgh.—Houses (112), Cowan Road; J. Miller, builder, 88, Hanover Street. School, Granton; executive officer to Education Authority.

Ellesmere Port & Whitby (CHESHIRE).—Houses (40); G. Heywood, builder, Whitby.

Enfield.—Development, Park Nook and Clay Hill House Estates; Bowyer & Bowyer. Extensions to wire works, Gt. Cambridge Road; F. Eve & Co., Ltd.

Essex.—School, Great Burstead; director of education, Chelmsford.

Ewell (SURREY).—Estate development, Hatch Furlong; C. E. O. Ward, architect, Winchmore Hill.

Fareham (HANTS).—Savoy Cinema (£20,000), for Fareham & District Entertainments, Ltd.; R. A. Thomas, architect, Cosham.

Farnham (SURREY).—Improvements to Poor Law Institution (£14,000), for C.C.

Glasgow.—Houses (36), Netherton; architect, Corporation Housing Department. Extension to factory, for Donaldson & Filer; J. T. Thomson, architect, 212, Bath Street.

Grays (ESSEX).—Houses (26); U.D.C. surveyor. Development of estate (8 acres), Whitehall Lane; Brown Bros., Ltd.

Herne Bay.—Shops and business premises, Congregational school site; R. Messenger, architect, 148, High Street.

Hertford.—Cinema, Ware Street and London Road (£25,000); E. Simmons, architect, 201, Nevills' Road, Letchworth.

Hertfordshire.—Extensions, Hemel Hempstead Poor Law Institution (£23,900); clerk to P.A.C., Hertford.

Hull.—Senior department, Eastfield Road School, for E.C. Central omnibus station; city engineer.

Irish Free State.—(CORK).—Houses (150), for Corporation; Meagher & Hayes. (DUBLIN).—Houses (138), Donnelly's Orchard; housing architect, Exchange Buildings, Lord Edward Street.

Irlams-o'-th'-Height (LANCS).—Houses (287), Oakwood Estate; J. Lane & Sons, Ltd., Swinton Park Road.

Isle of Ely.—Extensions to Mental Institution, Whittlesey, for C.C.

Kent.—Nurses' home, Alexandra Hospital, Swanley (£15,000), and extensions, Barming Mental Hospital (£50 000), for C.C.; clerk, Maidstone.

Lanark.—School; architect to E.C., Hamilton.

Lancashire.—Reconstruction of County Mental Hospital, Prestwich; Cruickshank & Seward, architects and surveyors, 18, Booth Street, Manchester. Senior school, Prestwich; County E.C.

Leatherhead (SURREY).—Development of Givons Grove Estate; Givons Leatherhead Estate, Ltd.

Lerwick.—Houses (60); G. W. Russell, town clerk.

Lincoln.—Power station, &c., County Hospital; W. G. Watkins, architect, St. Edmond's Chambers, Silver Street. R.C. church, St. Giles; Austin Garland, architect.

Linlithgow (WEST LOTHIAN).—Electric lighting of Victoria Hall for T.C.

London.—(BAYSWATER).—Premises for William Whiteley, Ltd.; A. D. Miller. (BERMONDSEY).—Clearance of Leroy Street area; borough engineer. (ELTHAM).—Church, Middle Park housing estate (£11,000); H. A. Welch, architect, 7, New Square, W.C.; Pitcher Construction Co., builders. (FINCHLEY).—School, Summers Lane; W. Moss & Sons, Ltd., builders, North Circular Road, N.W.2. (SYDENHAM).—Factory, for British Cellulose Lacquers, Ltd.; Chamberlain & Willows, architects, Moorgate, E.C. (TOTTENHAM).—Tote buildings, Harringay Park Stadium; Greyhound Racing Association.

Maidstone.—Re-erection of Barham Court, Teston, for Col. Sir C. E. Warde.

Middlesbrough.—Houses (200) and bungalows (12); S. E. Burgess, borough engineer, Town Hall.

Middlesex.—Elementary school, D'Arcy Gardens, Wealdstone, for County E.C.

Mottingham (KENT).—R.C. church, High Road (£7,500); priest in charge.

Newcastle-on-Tyne.—School, Cowgate; W. Hall, Ltd., contractors, Derwentwater Road, Gateshead. School, Wharrier Street; D. Eason & Harkness, builders, New Mills, Barrack Road.

Newton Abbot (DEVON).—Improvements to the Imperial Theatre for C. M. Myott, Newton Abbot Picture House, Ltd.

Northfleet (KENT).—Houses (200); U.D.C. surveyor.

Northumberland.—Hotel premises, Beadnell; Hicks & Charlewood, architects, 4, Mosley Street, Newcastle-on-Tyne.

Norwich.—Re-erection of boot factory, Westwick Street, for F. Maidment, Ltd. (£10,000); G. J. Smith, managing director.

Nottingham.—Cinema, Angel Row; A. J. Thraves, architect, 12, Victoria Street, Nottingham.

Padiham.—Public hall and library; U.D.C. surveyor.

Paisley.—Cinema (2,500 seats); W. J. Taylor, architect, Inverness. Infectious diseases hospital, Hawkhead (£97,000); Sir John Burnett, Tait & Lorne, architects, 1, Montague Place, London, W.

Ponders End.—Cabinet works extensions, Lincoln Road; L. G. Ekins. Factory extension, Suffolk Road; Hamilton, Son & Campion.

Pontefract.—Extensions, General Infirmary, with electrical work (£45,000); Tennant & Smith, architects.

Portland.—Council offices; Petter & Warren, U.D.C. architects, Old Sarum, Yeovil.

Preston.—Junior school, Ribbleton; W. Platt, borough engineer.

Purley.—Houses (24), Haydn Avenue; E. B. Clarke.

Ralston (RENFREWSHIRE).—Houses (350); J. Y. Keanie, Ltd., Floors Street, Johnstone.

Reading.—School (900 places), Whitley Park; C. Smith & Son, architects.

Reigate.—Extensions, Poor Law Institution; L. Burne, consulting engineer.

Sanderstead.—Shops, Addington Road; H. King.

Sheffield.—Development of Thorpe House Estate, Norton Lees; W. & J. Laver.

Skegness.—Conversion of Winter Gardens into cinema (2,000 seats); proprietors.

Southampton.—School for governors of King Edward VI School; secretary.

Southend-on-Sea.—St. Augustine's Church, Thorpe Bay (£12,000); Rev. A. J. Coombs, vicar.

South Shields.—Institute, Laygate Lane; Primitive Methodist Trustees. Reconstruction of St. Mark's schools; Church trustees.

Stainforth (YORKS).—Parish church; vicar.

Stourbridge.—Ward block and nurses' home (£50,000), Corbett Hospital; board of management.

Stroud (GLOS).—Development of Farmhill Park Estate; H. Wheatley & Sons.

Sunderland.—Houses (84), Commercial Road (£24,948); W. Welford, builder, Whitburn. Development of the sea front, Seaburn; T. P. Collinge, borough engineer, Town Hall. Rebuilding of Wearmouth Bridge Hotel, Monkwearmouth; Hetherington & Wilson, architects, County Chambers, Westgate Road, Newcastle-on-Tyne. R.C. school (460 places); A. Harrison, architect, 69, High Street, Stockton. New schools, Commercial Road, and Ford Estate; alterations, &c., to High Southwick School; O. T. Mark, architect, John Street.

Surbiton (SURREY).—Development of Haycroft Estate, Hook; Thorogood Bros. & Sons, contractors.

Surrey.—Additions to Effingham Council School (£2,795); County E.C.

Sutton Coldfield.—Houses (35), Keneton Road; J. White.

Swadlincote.—Cinema, Midland Road; L. F. Smith, architect, Derby.

Swinton and Pendlebury.—Houses; U.D.C. surveyor.

Tamworth.—Entertainment hall with cinema, George Street, for the exors. of J. Thornburn.

Wakefield.—Houses (46), Thornes Estate; Dobson & Goghall. Shop and offices, Westmorland Street; Gee, Blakey & Son, Ltd. R.C. school, Lupset, and alterations to St. Austin's R.C. School; Catholic trustees. Extensions, Technical College and School of Arts and Crafts; L. Ives, city surveyor, Town Hall.

Walsall.—Tuberculosis sanatorium (£14,602); borough surveyor.

Walton-on-Thames.—Extensions, Feltonfleet School; A. R. Slater.

Watford.—Rebuilding Regal Theatre for R. Sokoloff; W. J. Bull, resident manager.

Wealdstone.—Houses (82), Sports Field site, Charlton Road; N. D Maidman.

West Riding.—School, North Elmsall, near Pontefract; W. Hanley & Sons, builders, Hemsworth.

Weymouth.—Municipal offices and public library; borough surveyor.

Whickham (DURHAM).—Alterations and extensions to Memorial Hospital; S. J. Stephenson, architect, 2, Saville Place, Newcastle-on-Tyne.